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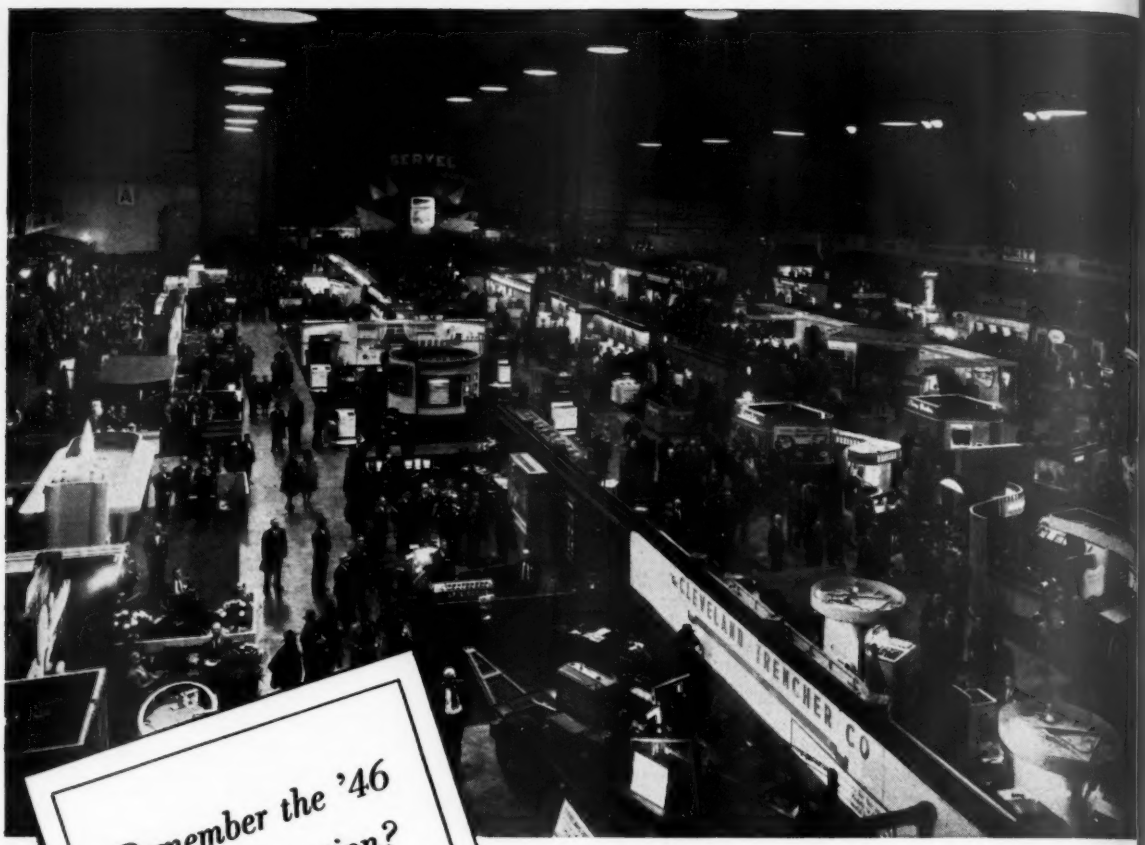

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THIS issue is dedicated to natural gas—the remarkable fuel which is transported 24 hours a day through a network of steel pipe more than 229,000 miles long—the fuel which flows at nearly express train speeds to supply more than ten and a half million customers with a clean, efficient flame. . . . Many of the most important issues facing the natural gas industry were discussed in detail at the Houston meeting and several of these have been selected for feature treatment this month. . . . B. D. Goodrich reports on a significant achievement by Texas Eastern —the first operational use of centrifugal compressors to move natural gas under high pressure over large distances. . . . William A. Dougherty analyzes results of a decade under the Natural Gas Act. . . . President Reed tells how natural gas can supply manufactured gas companies with an answer to a pressing challenge. . . . A particularly valid index of an industry's strength is the amount of money and effort it expends on research. N. K. Chaney shows how one vital factor is helping industrial research in general and gas production research in particular to plan for tomorrow. That all-important factor is the continued generous cooperation of the gas industry's best business and technical minds.

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Houston Host to Natural Gas

ONE of the nation's prime natural resource industries last month took stock of its phenomenal growth and embarrassing popularity when its leaders met in Houston, Texas, at the annual Natural Gas Spring Conference sponsored by the American Gas Association. During a two-day meeting at the Rice Hotel, May 4 and 5, the natural gas industry considered its responsibilities, expansion problems, operating techniques, supply, conservation, and regulatory topics.

More than 600 industry representatives took part in the two general sessions, transmission, production and storage, and accounting meetings. Robert W. Hendee, A. G. A. first vice-president, chairman, Natural Gas Department, and president, Colorado Interstate Gas Co., presided at the general sessions. The program was arranged by a committee headed by A. H. Weyland, vice-president and general manager, Arkansas Natural Gas Corp., Shreveport, Louisiana. Frank C. Smith, president, Houston Natural Gas Corp., Houston, Texas, was chairman of the arrangements committee.

With only the continued shortage of steel pipe preventing natural gas from reaching the last untapped major markets in the United States, it was natural that gas reserves, conservation, and methods of increasing distribution should receive paramount attention. At least six speakers concentrated on supply and conservation topics, giving a comprehensive account of the industry's position to date.

The case for manufactured gas companies receiving natural gas to augment their supplies was presented with forceful clarity by A. G. A. President Hudson W. Reed at the opening general session. As president of The Philadelphia Gas Works Co., Mr. Reed had encountered the same difficulties many other manufactured gas company officials have experienced—namely, sharply rising demands for gas, high operating costs as a result of skyrocketing prices of raw materials such as coal, oil and coke, and high cost of materials with which to expand production plants. He cited figures to show the effect on one large company and said that greater utilization of natural gas offers at present the only sound method of stabilizing production costs.

Warning that some manufactured gas companies face the possibility of pricing themselves out of direct competition, Mr. Reed appealed to the natural gas representatives to direct their attention to "lifting the iron curtain that now prevents natural gas, except in very limited quantities, from reaching manufactured gas territories." His provocative remarks are reprinted in full in this issue of the MONTHLY.

Prior to the president's address, Oscar F. Holcombe, mayor of Houston, welcomed the delegates and pointed out that they were in the center of one of the largest natural gas producing areas in the world. He described the tremendous industrial expansion of that area which, he said, is matched only by the growth of the natural gas industry itself.

•

A featured speaker at the first session was Price Daniel, Attorney General of Texas, who vigorously denounced the Supreme Court decision in the Tidelands case and called for Congress to restore tidelands ownership to the states. Not only is the ownership of untold quantities of oil and gas involved, he declared, but if the Federal claim to these rich tidelands is upheld it would destroy the whole system of dual state and Federal sovereignty in this country.

The gas pipeline market has provided a stimulus to the conservation of natural gas, D. A. Hulcy, president, Lone Star Gas Co., Dallas, told the convention in presenting a valuable review of nationwide conservation measures. "There is no greater urge to practice conservation than the one created by markets for the product to be conserved," he said. He pointed to the increase in net marketed production of natural gas from 1.3 trillion cubic feet in 1935 to more than three trillion in 1945 as "a vital factor in improving conservation practices in the production and utilization of natural gas."

Discussing problems confronting the transporter of gas, Mr. Hulcy said "the process of proration has developed to a considerable degree, and there is little doubt that the proration of gas withdrawals among wells and leases within an individual field will become more and more the general practice until it is universal."

In his opinion, this procedure will enable the field to pro-

← This hitherto unpublished view of absorbers at Fritch, Texas, plant of Texoma Natural Gas Company has hung in international photographic salons in Chicago, Boston, and Cincinnati. Picture by T. H. Beals, Natural Gas Pipeline Co. of America

Visitors from California: (l. to r.) S. S. Donaldson, F. A. Hough, W. M. Jacobs, vice-chairman, A.G.A. Residential Gas Section, and J. A. Millen

R. W. Hendee, chairman, A.G.A. Natural Gas Department; E. J. Boothby, Washington Gas Light Co.; F. M. Banks, Southern California Gas Co.

Checking up on natural gas program pointers are C. H. Zachry (left), Southern Union Gas Co., and Randolph Caldwell, an independent producer

duce the greatest possible amount of gas and at the same time protect the correlative rights of owners.

Uniform spacing of wells is essential to promote conservation, Mr. Hulcy continued, and this leads to the subject of unitization or pooling of producing properties. "One of the primary advantages of pooling is that wells may be more uniformly and more widely spaced," thus contributing to more efficient operation and conservation.

The practice of venting casinghead gas to the air came in for extended discussion by Mr. Hulcy who declared that it is an obligation of gas pipeline operators to take such gas under any circumstances within reason. He pointed out that Lone Star is currently taking casinghead gas in Texas at the rate of 38.3 percent of its total takes in the state. The daily average production of casinghead gas in Texas amounts to more than three billion cubic feet, Mr. Hulcy reported, and 47.17 percent is vented to the air. He called this a fertile field for further conservation endeavors.

Despite this situation, "truly tremendous strides have been made in overall, nationwide natural gas conservation," Mr. Hulcy maintained. "In the first place, the venting of casinghead gas is not a nationwide problem but is limited to those areas where geography and other considerations, including large amounts of necessary oil production, make it impossible at the moment for all casinghead gas to be utilized.

"In the second place," he continued, "conservation of natural gas as it is produced from gas wells has reached a state of perfection on a nationwide basis which would have been considered unattainable no more than 15 years ago.

"Finally, there has been remarkable accomplishment in the realm of processing natural gas for the recovery of liquefiable constituents. The 442 plants operating in 1947 to recover liquid hydrocarbons from natural gas, produced more than 5½ billion gallons of liquid products during the year, an increase of 14 percent over 1946.

"This is an attainment of considerable magnitude in the matter of conservation of natural gas in the large sense," Mr. Hulcy concluded, "and the prospects for the future are even more impressive."

William A. Dougherty, New York attorney, outlined the significant developments in the industry during the first decade under the Natural Gas Act. The Federal Power Commission in administering the Act has reduced gas rates to the extent of about 40 million dollars annually, Mr. Dougherty said, making gas the lowest cost fuel on the market and encouraging a too rapid demand for gas in house heating and industry.

Mr. Dougherty gave the history of some of the major rate cases and analyzed the Moore-Rizley Bill. Unless the bill is passed, he declared, producers are going to be unwilling "to put their heads in the noose of jurisdiction," referring to the reluctance of gas producers to come under Federal regulation if they sell gas to pipelines which are under such regulation. He advised producers and distributors to maintain a united front. The complete text of Mr. Dougherty's remarks is published elsewhere in this issue.

The great problem of flare gas, according to Paul Kayser, president of El Paso Natural Gas Co., Houston, is that it "is easy to say stop it, but very difficult to do." It is an economic question based on quantity, life of the reserve, distance from market, price, the market price of gasoline, and the load factor.

Referring to the Texas-California line of his company, Mr. Kayser said when the ultimate capacity is reached they will be delivering 900 million cubic feet a day to California of which 550 million will be flare gas. Total cost of facilities to transmit the 900 million cubic feet will be $140 million.

Sustaining the deliveries necessary to support this investment is no simple task, he said. "We regard the amortization of the field installations through proper depreciation charges on the basis of a conservative life as the most important

W. B. Tucker (left), Milwaukee; P. V. Mullins, Bureau of Mines; G. P. Bunn, chairman, Transmission Committee; A. L. Bristow, Northern Natural Gas Co.; H. D. Hancock, chairman, Technical and Research Committee; Robert R. Suttle, S.G.A.; E. S. Pettyjohn, Institute of Gas Technology; A. F. Bridge, Southern Counties Gas Co.; T. J. Strickler, The Gas Service Co.; Frank H. Adams, Surface Combustion; A. H. Weyland, chairman, Program Committee

point in the whole program. This fact is one of the most important distinctions between marketing of dry or formation gas whose flow can be regulated to the needs of the pipe line and the marketing of flare gas that is regulated solely by the production of oil.

"The flare gas must be taken and marketed as it flows or else it is lost forever," Mr. Kayser pointed out. "So any company marketing such gas must be prepared to put in additional facilities as new fields are brought in and must be prepared to abandon old fields as they become depleted from production of oil. In no other way can a pipe line be assured of sustaining its main transmission facilities over the estimated life of the supply from the area."

Opening the second general session, Wednesday, C. H. M. Burnham, chairman, A. G. A. Pipe Line Flow Subcommittee, and vice-president and chief engineer, Panhandle Eastern Pipe Line Company, Kansas City, Mo., presented a progress report on the pipeline flow research being conducted by the Bureau of Mines under a cooperative agreement with A. G. A. Experimental results with short sections of pipelines and laboratory work were discussed.

The operational use of centrifugal compressors for the first time on any gas pipeline was described by B. D. Goodrich, chief engineer, Texas Eastern Transmission Corp., Shreveport. Experience with these compressors on the Big and Little Inch lines at pressures of from 500 to 800 pounds developed some interesting facts which are brought out fully in Mr. Goodrich's paper, reproduced in full in this issue.

E. S. Pettyjohn, director, Institute of Gas Technology, Chicago, told the natural gas men that their peak load problem is insignificant compared to that of manufactured and mixed gas companies serving the highly-populated cold northern industrial areas, such as Chicago,

J French Robinson (top left), The East Ohio Gas Co.; Lyle Harvey, The Bryant Heater Co.; Frank C. Smith, Houston Natural Gas Corp.; Mayor Holcombe; John C. Flanagan, United Gas Corp.; D. A. Hulcy, Lone Star; Hudson W. Reed, A.G.A. president; and Chester L. May, Lone Star Gas Co.

New York, Philadelphia and Boston. Citing the tremendous demand for gas house heating in those areas, he stated that even a small increase in market saturation involves formidable peak load problems.

The best use manufactured gas companies in these areas can make of natural gas is to employ it in place of oil as an enriching agent, Mr. Pettyjohn said. He described a number of important research projects under way at I.G.T. and others sponsored by A. G. A. which are designed to provide more economical ways of providing base and peak-load gas.

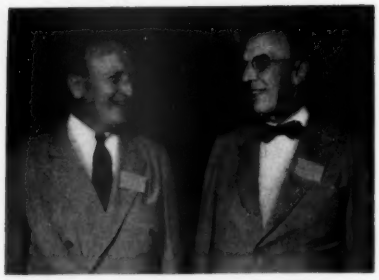
Reporting on "Mobile Radio as an Aid to Dependable Gas Service," Edward M. Borger, chairman, A. G. A. Mobile Radio Committee, and president, The Peoples Natural Gas Co., Pittsburgh, declared that the present situation with respect to frequency assignments can only be described as "chaotic."

His committee is battling to keep the gas industry in a favorable position for allocations and he urged companies which desire to use mobile radio to file applications in order to protect their chances for channel allocation. The band of the radio spectrum available for mobile radio is very crowded, he explained, and there is great competition among utility companies, television, broadcasters, police, fire, forestry, and other industries.

At the present time, Mr. Borger said, there is a total of 31 channels available to power utilities, but they are shared with petroleum pipeline operators and "other industries requiring similar radio service." The power utilities, which include gas companies, feel that they should be definitely distinguished from general industrial operations and should be recognized rather as a "safety service" on a par with police and fire services. Such recognition, Mr. Borger pointed out, would strengthen the hand of the utilities in securing necessary exclusive channels for their use.

Following the second general session, many delegates made an inspection tour of Katy Field, the third largest oil and gas production area in the nation. The field, discovered in 1935 and unitized in 1940, provides a fine example of conservation. Operated by Humble Oil and Refining Co., it includes a recycling plant which strips gas of its valuable condensate, returning the gas to under-

G. F. Mitchell, The Peoples Gas Light & Coke Co.; I. K. Peck, The Manufacturers Light & Heat Co.; E. M. Borger, chairman, Mobile Radio; W. C. Beckjord, F. S. Fields, The Cincinnati Gas & Electric Co.; Mr. Mitchell; W. E. Steinwedell, Cleveland; C. E. Bennett, The Manufacturers Light & Heat Co.; J. F. Gray, Dallas; J. H. Dunn, The Shamrock Oil & Gas Corp.; M. L. Mayfield, Houston; L. T. Potter, chairman, Production and Storage



H. Leigh Whitelaw (top left), G.A.M.A., M. L. Sperry, Washington Gas Light Co.; F. W. Peters, (bottom left), chairman, Accounting Committee; and Price Daniel, Attorney General of Texas

ground storage for future use.

Technical sessions sponsored by the Transmission, Production & Storage, and Accounting Committees of the Natural Gas Department rounded out the informative program. The two meetings of the transmission group were held under the chairmanship of George P. Bunn, A. G. A. committee chairman, of Phillips Petroleum Co., Bartlesville, Oklahoma. L. T. Potter, chairman, Production & Storage Committee, and assistant to the vice-president, Lone Star Gas Co., Dallas, presided at the production and storage meeting, and F. W. Peters, chairman, Accounting Committee, and treasurer, Oklahoma Natural Gas Co., Tulsa conducted the accounting roundtable conference.

Opening the production and storage meeting, J. H. Dunn, president, The Shamrock Oil and Gas Corp., Amarillo, described the role of the independent producer in the natural gas business. With few exceptions, Mr. Dunn reported, "gas pipelines must depend to a very great extent upon the independent producer for the sufficiency and dependability of their supply of gas." Not one of the 66 major gas fields brought in since 1916 was discovered by a gas pipeline company, but all were discovered by independent producers. He predicted that the importance of the independent producer would increase rather than diminish.

If the independent producer is to continue to make gas reserves available to the pipelines, Mr. Dunn said, there must be a different approach to long term contracts and the producer must be given his share of the value of recoverable liquids and of the increased value of residue gas. He noted that some existing contracts fail to make provision for these elements, and many of them made at distress prices have obviously become unfair. Only when the producer and pipeliner have found a proper balance for satisfactory relations will the real interest of the consumer be served, he concluded.

James F. Gray, Dallas attorney, next turned the spotlight on the royalty owner and his relation to the natural gas business. Calling for fair treatment to such owners, he charged that many royalty owners are confused as to whether they are for or against the gas industry and many of them are definitely antagonistic.

Reasons for this situation, Mr. Gray explained, are to be found in "unpleasant personal experience" such as those involving contracts based on an arbitrary flat price for gas regardless of its actual market value, failure to take the royalty owner into the benefits derived from unitization and pooling, failure to include the value of liquids in returns, and unfair measurement practices.

Despite these conditions, the royalty owners and those otherwise engaged in the natural gas business have a common cause and Mr. Gray was optimistic that they will eventually work together for the good of the industry and its thousands of customers.

Further light was thrown on the casinghead gas problem in Texas by M. L. Mayfield, Houston petroleum and natural gas consultant, who presented a comprehensive report on this vexing situation. He said Texas is producing daily about three billion four hundred million cubic feet of casinghead gas from 110,000 oil wells in 1,000 gas fields scattered over two million producing acres.

While the oil industry is spending a hundred million dollars to process this gas, the volume flared is on the increase due largely to the great cost of building facilities to process the gas for pipeline use. Since September, 1945, 46 plants have been built, 22 more are being constructed, and 30 additional plants are projected. When all are in full operation, they will handle a billion cubic feet a day, Mr. Mayfield reported.

Steps to be taken to further progress in capturing this casinghead gas were recommended by Mr. Mayfield as follows: immediate reduction of the allowed gas-oil ratio, which is now 2,000 cubic feet of gas to a barrel of oil; place each reservoir on a volumetric basis; form an operators' committee in each field to advise the state railroad commission on field rules; develop new industries to use the gas, and have the pipelines make greater effort to handle that gas which fits into their particular requirement.

Initial speaker at the Tuesday transmission session was W. B. Tucker, Allis-Chalmers Manufacturing Co., Milwaukee, who discussed "The Gas Turbine as a Power Generation Unit for Use in Connection with Pipe Lines." Turbine development holds considerable promise, Mr. Tucker declared, pointing out that in jet-propelled gas turbines efficiency and turbine life are sacrificed to speed, while in the gas industry the former are important.

For long life units, Mr. Tucker suggested a temperature of 1,150 degrees F realizing a thermal efficiency of some 2 percent. Advantages of turbines were listed as low maintenance costs, the need for little or no water, very little lubricating oil required, ability to install in small space, can burn gas or low cost fuel oil, can be installed almost anywhere independent of sources of auxiliary power, start in short time (three to ten minutes), and minimum stresses due to temperature.

Pressure control and other problems of long line gas dispatching encountered in the operating of Northern Natural Gas Company's 3,800-mile system were related by A. L. Bristow, chief dispatcher of that company. Shortages of steel pipe and abnormal high demand for gas have made the dispatching department one of the most vital in a gas system, he told the delegates.

"Curtailment of interruptible customers has become one of the chief functions of the dispatching department," he said. "As an example, during the 1943 heating season interruptible customers were curtailed approximately five percent of their total requirements, as compared to *(Continued on page 4*

An "Outsider" Looks to Natural Gas

Supplies for use as enriching agent should be increased in order to stabilize manufactured gas production costs and strengthen position of the entire gas industry

By HUDSON W. REED

President, American Gas Association, President, The Philadelphia Gas Works Co., Philadelphia, Pa.

MY experience in natural gas to date does not amount to much, in fact it is limited to the receipt of a few million feet per day. This token delivery we fully expect will be greatly increased during the next few months.

I mention our expectations of shortly receiving natural gas in Philadelphia to show that my remarks are not made for any selfish or personal motive. I see my own company's position greatly improved for the next two years, and in the tempo of business today, two years seems quite a length of time.

The constantly increasing volume of natural gas now transported from this area as well as the stabilization of its price is sufficient evidence that the natural gas branch of the gas industry is still on the upward swing. It is in fact in such a strong position that any complimentary remarks I could make would be superfluous.

I am extremely sorry that I can not report that the manufactured group of our industry is in the same enviable position. One needs only to note the constantly increasing number of rate increases made by companies serving manufactured gas to realize that many such companies are facing operating troubles which are exceedingly serious.

This condition is not due to a lessening of demands for gas. To the contrary, sales have been exceptionally good over the past few years. In fact never before has there been such a general demand for gas service as experienced today. The cause of our ills arises from two other sources: First, the greatly increased cost of providing additional production facilities; and second, the high cost of and the difficulty in securing the materials required for manufactured gas.

To illustrate the difficulties now faced by many manufactured gas companies, examine the increased production costs of one company. These authentic figures are typical of those in this branch of the industry.

Since 1940 the posted price of Bunker C oil has increased from 98 cents to $3.02 per barrel. The price of coke, due mainly to the increase in the cost of coal, has increased from $7.25 to $13.60 per ton. Due to the increase in price of these two gas making materials, production costs for this company have increased on an annual basis approximately $8,750,000. On an M.c.f. basis the production cost of 530 B.t.u. gas increased about 27 cents and on the basis of 1,000 B.t.u. gas (natural gas) costs rose about 51 cents.

Thus with sales almost doubled and rate increases exceeding $5 million annually, this company is currently operating in the red. Nor is the answer further rate increases, for the principal competitor in the household has held the line on its prices. Consequently, with high rates gas would lose its competitive position, new sales would dry up, and losses accelerate. The end result might be a slow but sure creeping paralysis of the gas business.

Let me sum up the increased production cost of manufactured gas in this way. Increased cost of manufactured gas for this company because of increased cost of oil and coke alone during the past few years is about double the price now paid for natural gas by most distributing companies.

Now just a word on the cost of new production capacity. Construction costs of water gas facilities have increased from $160 to $400 per M.c.f. With the shortage of oil and coke suitable for gas making, as well as their constantly increasing prices, investment in additional water gas facilities at present construction costs would involve a considerable risk.

You may ask—why not switch to coal gas plants? The company I speak of has about $30 million invested in its water gas plants. To replace its present capacity with a coal plant at today's costs would require an additional investment of approximately $90 million. Such an investment is unthinkable for the same capacity it now has available. Besides, it would create the problem of disposing of over four million tons of coke annually.

What I wish to point out is that unless gas can be obtained from sources other than oil and coal, manufactured gas may be priced out of competition with other fuels, unless the price of oil is greatly reduced. Present indications do not point to a downward trend in the price of oil.

You may feel that such a condition, the loss of business due to the high production costs, will not affect the strong position now enjoyed by those companies serving natural gas. I believe that is erroneous thinking. Should the sale of manufactured gas be lost to competing fuels because of its present high cost

In the limelight at Houston meeting: Hudson W. Reed (left), A.G.A. president, and Paul Kayser, president, El Paso Natural Gas Co., speaker

Presented at spring meeting, A. G. A. Natural Gas Department in Houston, Texas, May 4-5.

the impetus gathered by the large increase in the electric load for cooking, water heating, and refrigeration would eventually make *serious* inroads in the sales by natural gas companies. Trends of the buying public can not readily be localized. A change in the buying habits in one locality *often* produces a dangerous reaction in adjacent localities. Furthermore, the business lost could not be replaced on as profitable a basis.

What then is the answer? There seems at present but one way out. That way is for manufactured gas companies to utilize natural gas in conjunction with their own production facilities, so as to produce a gas which can be sold competitively and at the same time to secure the benefit of the resulting increase in plant capacity. This is a sound method of reducing production costs, as has been proven.

It would therefore seem to me, as an outsider looking in, that it would be a protective measure for the industry as a whole if the manufactured gas companies could, as my own company will do shortly, have enough natural gas available for use as an enriching agent

Turning valve to let first natural gas into Philadelphia: Mayor Samuel (left), J. V. Postles, The Philadelphia Gas Works Co., and C. L. Brockschmidt, Texas Eastern Transmission Corporation

to a low B.t.u. manufactured gas. This would permit a stabilization of production costs to a degree that sound future operation could be obtained.

To accomplish this aim I realize fully that considerable cooperation must be had not only from pipeline companies but also from territories now served with straight natural gas. It would mean *lifting* the iron curtain that now prevents natural gas, excepting in very limited quantities, from reaching the manufactured gas territories.

I realize that what I suggest can not be accomplished over night. It must be a gradual transition over several years. Neither do I suggest that the gas now sold to straight natural gas companies be relinquished by them for the benefit of companies not at present receiving it. I merely direct your attention to a possible plan which could readily strengthen the gas industry as a whole.

It seems to me as an outsider looking in, that the distribution of natural gas should be considered from two angles:

First—the most advantageous policy to be followed by the producers and the transmission companies. Is it in their best interest to sell the gas in territories adjacent to the producing wells at a marginal price; or to get gas to a more profitable market where its use will tend to protect and perpetuate the high level of business you are now enjoying?

Second—should a natural resource such as natural gas be sold for the benefit of millions of domestic customers for home use such as cooking, water heating, and refrigeration, or should the objective be to sell it to a large extent to a few hundred large industrial users?

These two questions are not for me to answer, they must be answered by your industry. But, again, as an outsider looking in, I do not believe that the sale of natural gas should be limited to sections designated by those now using it.

It would seem to me that if we are to avoid more drastic regulation a more comprehensive plan must be worked out within the industry for a more equitable distribution of your product. We need this comprehensive plan in order to break out of a stalemate where markets not clearly defined, and problematical pipe delivery schedules delay our industry's progress toward making the gas available where it is most needed.

Until a change in present procedure is made we shall find company against company, community against community, and state against state. This unhealthy condition may finally result in additional regulation to that we now have, and these result in turn in decisions which may or may not be the best for the industry.

A chain is only as strong as its weakest link. The weakest links in the gas industry today are those companies facing the possibility of pricing themselves out of direct competition to temporarily keep their heads out of water. An understanding which will permit both the "haves" and the "have-nots" to participate in use of natural gas may be most beneficial to all branches of our industry.

Industry Is Tough

I trust that my remarks will not be construed as my believing that the manufactured gas companies are facing a near collapse. *They are not.* The gas industry is a tough one. It has had to be tough to weather the many competitive assaults during its life of more than one hundred years. It will win out again and be stronger than ever, especially if a plan can be worked out whereby help in the near future can be obtained from the natural gas industry.

It has often been stated, and rightfully so, that the natural gas industry has accomplished many seemingly impossible feats. I have outlined another problem that will test the ability and ingenuity of natural gas men. We in the manufactured gas department will give you our complete cooperation in aiding you to meet this new challenge.

Double Exposure

● One corporation president has for years separated his daily mail into two piles—"Strictly Routine" and "Double Exposure." "Strictly Routine" letters he dictates speedily and signs without reading. "Double Exposure" letters he dictates thoughtfully and has typed on plain paper, triple-spaced for easy revision. These letters he allows to "season" overnight, or for three or four hours if they must be answered the same day.

Invariably he finds that a better or less hackneyed word or phrase can be used here and there, or a brief paragraph added to humanize the exchange of correspondence.

Some letters he revises drastically, and includes the kind of points that so often occur to one after a letter has been mailed.

This executive testifies that his double exposure technique not only improves his letters but cuts down the volume of his correspondence, since every important letter he writes is so carefully thought out and so complete and definite that it obviates the back-and-forth letters often required to cover all angles of a situation.

——*Management Briefs (Rogers & Slade)*

Gas Production Research Keys Industry's Progress

Cooperation of top business and technical leaders assures maximum possible return per dollar of A.G.A. research expenditure

By N. K. CHANEY

Research Consultant, American Gas Association, New York, N. Y.

N. K. Chaney

IN a recent address the writer traced the development of industrial research from the period of the great individualistic pioneers, represented by such names as Fulton, Morse, Bell, Marconi, Goodyear, and, in the gas industry, Lowe of carburetted water gas fame, to the modern era of organized research represented by such names as Whitney of General Electric, Reece of duPont, Duncan Kennedy of Mellon Institute, Jewett of American Telephone and Telegraph, Mees of Eastman Kodak and Kettering of General Motors.

The latter were pioneers of a new kind. Men of science in their own right, they had a rare capacity for persuading highly individualistic research workers to team up in collective research enterprises, and at the same time the ability to enlist the confidence of business leaders in the economic possibilities of research to industry. In these days it is difficult to visualize the adjustments which this marriage of science to industry entailed. Research workers were apprehensive of regimentation. Business executives found the language of the research worker obscure, and were doubtful of their ability to distinguish between scientific research and pseudo-scientific boondoggling.

These problems we still have with us, but the uncertainties as to whether they can be solved have vanished. Industrial research has come of age and become an essential industry. Look at the record.

"For more than 70 years" says Dr. Slichter of Harvard, "The number of physicists, chemists, engineers and metallurgists has been increasing from ten to 14 times as fast as the gainfully employed. Expenditures on industrial research in 1939 were nine times as large as in 1920. Research is contagious because if one concern does it, its competitors must do so also, or be left behind."

Said R. P. Soule before the American Bankers Association "One of the best tests of management in industry at present is its attitude toward research. The biggest gamble is to do no research at all."

The NAM in its recent publication "Trends In Industrial Research" reports that over 76 percent of the nearly 1,000 manufacturers who answered its questionnaire, carried on research; that many anticipated a sharp rise in aggregate expenditures in 1947 compared with prewar years, the increases in some cases being as much as tenfold those of 1939.

Along with this general acceptance of research as an essential business expenditure, new forms of research services are for sale as an industrial commodity. Its advantages are no longer limited to those companies and associations in position to equip and staff their own laboratories. Such "pay as you go" institutions, selling research services tailored to fit the requirements of the client, have taken many forms. Typical examples are Mellon Institute, Battelle Memorial Institute, the Institute of Gas Technology, the A. G. A. Testing Laboratories, technical departments of many universities, firms of private chemical consultants, and some governmental bureaus such as the National Bureau of Standards and the Bureau of Mines, offer many and varied types of service.

The successful conduct of organized research involves much more, however, than the possession of or the ability to hire adequate research services. In business a research department is comparable to a "drive it yourself" motor car. Its use requires a driver, a road map, and a destination. To supply these requirements is the ultimate responsibility of business management, and this job can never be delegated. In the case of association research this function of management in industrial research must

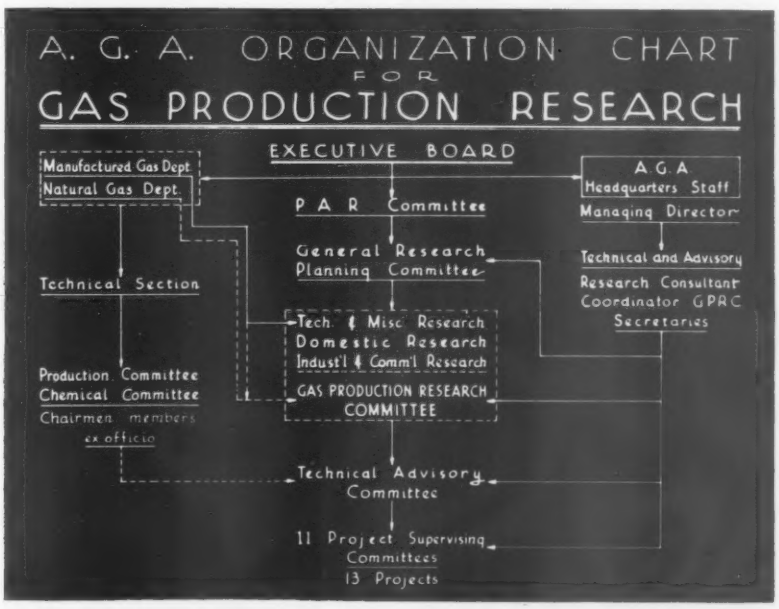


Figure 1. Streamlined committee set-up shows the course which a new A.G.A. research project must take

Presented at annual meeting, Pennsylvania Gas Association, Wernersville, May 18-20.

be supplied by the research managing committees, and for this reason the policy making executives of the individual member companies must be adequately represented on these managing committees.

Lower Cost

The relevance of such developments to Association research will be obvious. It used to be a moot question whether any association of independent companies could possibly hope to formulate and execute long-range research programs with the efficiency and continuity so successfully displayed by major corporations having the advantages of centralized direction and control. The advent of research as a purchasable commodity has greatly eased the associations' problems by eliminating the necessity for acquiring the special know-how and experience required to staff and organize a research department. There are also important compensating advantages for association research as compared with private research. A major advantage is the lower cost of research per association member. Administration costs of research are always high and perfection is never achieved in the best of companies.

Assuming, for example, that the overhead costs of research administration are 100 percent of the direct research work, this would mean that an independent company would get 50 cents worth of actual research effort for each research dollar spent. Compare this with one of ten association members each of whom pays one-tenth of the total research budget dollar or a cost of ten cents. Each such member gets all the benefits of 50 cents cost of actual research effort with two exceptions: (1) no member company can thus obtain a patent monopoly which will enable him to deny the benefits of the research to his fellow members and (2) no member can collect royalties from the other for using the new processes. Patent monopolies offer the private industrial company the possibility of either improved competitive advantages over rival companies or of large profits through royalities—thus the inducement to take higher risk. No such competitive advantage accrues to a utility and none is needed.

Hence, assuming reasonable efficiency, collective or association research promises the average "non-competitive" utility the greatest possible return per dollar of research expenditure.

The American Gas Association possesses important advantages compared with many associations for the wise planning and efficient conduct of collective research for the industry.

First, between the gas utility members of the Association there is a highly unusual degree of freedom in the interchange of technical and operating experience. Second, the amount of time and effort which is freely devoted to Association assignments by the top executives and by the rank and file of technical workers and operators is quite exceptional. Consequently the personal relations between working members of the Association are exceptionally closeknit and harmonious. Finally, through the wise planning of its officers, the Association has created a headquarters staff and technical secretariat of exceptionally diversified experience and versatility. These are assets of incalculable value.

Recently these natural assets have been further implemented by changes designed to streamline the relationships of the committees primarily responsible for Association research. In the case of gas production research these changes began with the PAR Committee and ended with the project Supervising Committees. By way of illustrating the safeguards which have been devised to insure the wisest possible expenditure of the Association's research funds, look at the accompanying organization chart and follow the course a new research project must take.

The Gas Production Research Committee is the key policy and administrative body for this phase of our research work. This committee first receives any new proposal from whatsoever source. It may act directly or it may refer the project to the Technical Advisory Committee for preliminary study and report. The project then goes to the Research Planning Committee which is responsible for the division of the Association's research funds between the four major research committees shown below it on the chart. The project goes next to the PAR Committee, which is responsible for the overall allocations of the total available funds between promotion, advertising and research.

If these hurdles as to money are safely passed, the project then comes back to the Gas Production Research Committee for administration. The latter thus assumes the principal roles of business management on behalf of the Association in respect to all the projects which it sponsors. Its personnel should therefore include those in a position to decisively influence the production policies of their companies and of their industry as a whole.

This committee depends for technical assistance, however, upon the Technical Advisory Committee, which in turn is recruited from the best technical brains of the industry. In the administration of a new project, these two committees now cooperate by setting up a Supervising Committee charged with immediate responsibility for overseeing the project. The latter directly contacts and advises the research workers to whom the project is assigned. It is its duty, acting through the Technical Advisory Committee, to keep the Gas Production Research Committee informed of its opinions and findings as the work progresses.

Considering the difficult period in which these committees were established with war shortages of both qualified technical personnel and materials and the relatively short time in which they have been operating, the variety and balance already obtained in the Gas Production Research program is no small achievement.

The question of making an effective liaison between the Technical Section and the research committees functioning under Gas Production Research has been solved by making the chairman of the Production and Chemical Committees, ex-officio, members of the Technical Advisory Committee, and by oral reports from the chairman of the latter to these two committees.

Staff Augmented

The headquarters research advisory staff has been augmented, the research consultant and the coordinator of gas production research serving as secretaries to the General Research Planning, Gas Production Research, and Technical Advisory Committees. Each also sits upon the project Supervising Committees.

Organization charts are meaningless without the necessary motive power. But the machinery is important in controlling the release of energy. The kind of a ride which one may get for a gallon of

GAS PRODUCTION RESEARCH PROJECTS

PROCESS ENGINEERING RESEARCH

No. CPR-1C	Study of Hydrocarbon Reforming	I.G.T. & Phila. Elect. Co.
No. CPR-7	Sulfur Resistant Catalysts	Institute of Gas Technology
No. HB-1	Hall High B.t.u. Oil Gas Process	Consol. G. E. L. & P. Co. of Balt.
No. CPR-17	Fluidization Study	Institute of Gas Technology
No. CPR-24	Coal Gasification	Institute of Gas Technology

PRODUCT & ANALYTICAL RESEARCH

No. CPR-23	Enriching Value of Oils for Carburetion	Institute of Gas Technology
No. PSC-1	Tar Investigation	Pennsylvania State College
No. NBS-1	Gas Analysis Investigation	Bureau of Standards
No. TL-1	Mixed Gas Research	A. G. A. Testing Laboratories
No. CPR-25	Organic Sulfur Research	Institute of Gas Technology

FUNDAMENTAL RESEARCH

No. CPR-5B	Reactions Between Oxygen-Steam & Carbon	Institute of Gas Technology
No. BMI-1	Water Gas Reactions	Institute of Gas Technology

Figure 2. A bird's-eye view of projects which are now under way in A.G.A. gas production research

gas depends upon the design of the machine. In building better machines for industrial research we have much to learn from the industries which first built them.

The question may be asked why the building of such research machinery should concern the rank and file of the gas industry. The answer is that since association research must function by democratic processes of cooperation between its members and through its research committees, a widely diffused knowledge of how these modern research tools have been developed by sister industries, and how they should function is even more important to us than the great centrally controlled industrial companies. We, more than others, need a common language and a unifying philosophy.

This brings us to the question of research definitions. The NAM report referred to previously speaks of basic or fundamental research and of applied research. But what is fundamental research? What distinguishes it from applied research? In what way are the two related and what ratio between them does past experience prescribe for industry?

Possibly no more helpful and constructive answers have been given to these questions than those by one of the great pioneers of modern industrial research given many years ago. Dr. Whitney says the essential difference between pure research and engineering research was not a matter of methods but simply one of motive.

Pure research might be conducted with a magnifying glass. Applied research might require an electron microscope, or vice versa. The complexity or simplicity of the research tools has nothing whatever to do with the case. There are two legitimate motives—curiosity and utility.

Research, he said, is pure if motivated solely by the curiosity of the investigator about the thing investigated. Its primary objective is knowledge or information. Engineering research, on the other hand, is motivated only by reasons of practical utility. The engineering researcher must know his objective. He attempts to assess its prospective values in terms of the prospective costs of realization. If the balance sheet looks unfavorable there is no project.

Such bookkeeping is not possible in the case of pure research. The avowed purpose is not to reach a clearly defined objective but to find out what lies beyond a visible horizon. Setting values upon what one does not know is futile. The only measure of success is whether something new has been learned. It is, of course, not improper to take cognizance of the fact that pure research sometimes pays dividends in the field of engineering research.

Also in engineering research the possibility of extra dividends in the way of new information need not be ignored. But objective planning and proper cost accounting demands that these hypothetical extras should not be used as smokescreens to becloud consideration of the primary objectives. It is mere double talk to defend a purely utilitarian project on the ground that if continued some new and unexpected information might possibly come out of it. It is equally shortsighted and sometimes painfully disillusioning to embark upon an undertaking in pure research with the firm expectation that it will pay its own bills.

Whitney makes the only legitimate defense of pure research in industry. It's a fact that industry cannot live on the bread of engineering research alone. Whitney argues that frequently engineering research, left to its own devices, has a way of winding up in deadend streets. What then sometimes saves the engineering researcher from beating his head blindly against stone walls is the research of pure curiosity.

An illustration is the notable cat's whiskers and crystal period of radio detectors in the 1920's. Applied research was then endlessly searching for processes and materials wherewith to make better crystals and more sensitive cat's whiskers. The going was very hard. Suddenly the engineering possibilities of modern radio tube detection appeared as out of a blue sky,—the result of pure research in other fields, an example of which was Langmuir's curiosity about the emissivity phenomena of filaments heated in high vacua.

Notwithstanding all this, Whitney was the first to admit that the ratio of pure to applied research, in most industrial organizations, must be very small. One good reason, said Whitney, was the shortage of the kind of "unhampered inquiring minds" essential to the research of curiosity. Not only are there not enough such minds to go around, but it is not easy for business managements to leave unhampered such inquiring minds as they may have the good fortune to possess.

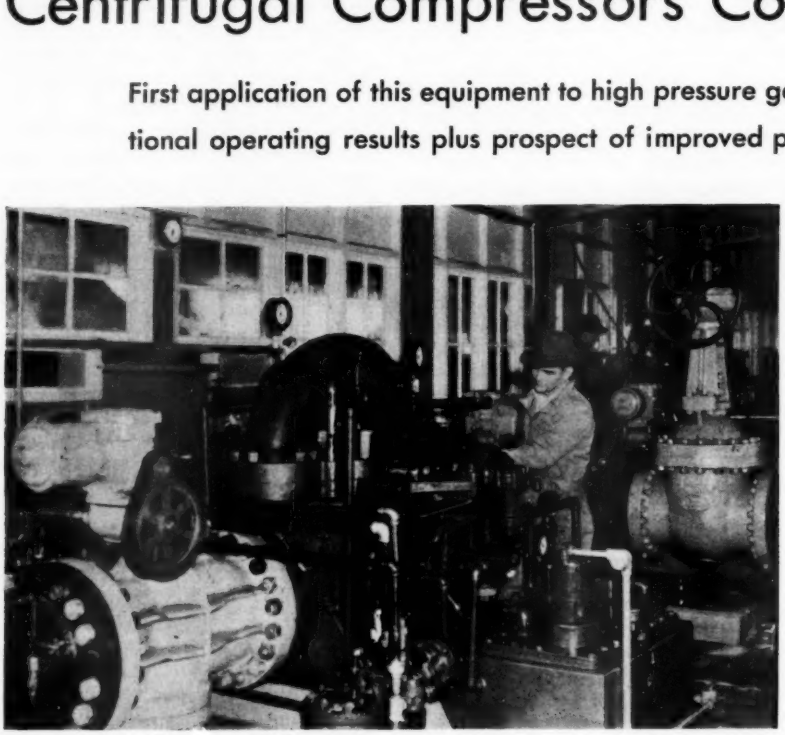
Supplies Calories

Another reason is that engineering research is the bread and butter which supplies the calories that make the wheels go around, while pure research in small doses supplies the less obvious vitamin deficiencies.

Nevertheless one of the first problems of a business management desirous of conducting research is to find some way of obtaining its minimum requirements of disciplined and imaginative curiosity. Wherever a project originates, its implementation is impossible without the enlistment of qualified research workers. To insure the continuity and stability of effort which will attract such workers requires that the rates of expenditure on pure research be *(Continued on page 43)*

Centrifugal Compressors Come of Age

First application of this equipment to high pressure gas transmission produces exceptional operating results plus prospect of improved performance and expanded uses



Centrifugal compressor unit for high pressure transmission of natural gas at Little Rock, Arkansas

By B. D. GOODRICH

Chief Engineer, Texas Eastern Transmission Corp., Shreveport, La.

CENTRIFUGAL compressors are being used to move large volumes of gas under high pressures over long distances for the first time by the Texas Eastern Transmission Corporation. This gas is being transported through the famous Big Inch and Little Big Inch oil lines which the company purchased from the government in 1947. Experience with these compressors at pressures of 500-800 lbs. has developed some very interesting facts about their application for this service.

Prior to the time that Texas Eastern Transmission Corporation made the decision to use these machines, only one other application had been made in this type of service. According to the records, this installation had been in the nature of an experimental unit and was never put into regular service although the information obtained from the tests indicated that the compressor had met the designed conditions satisfactorily. Therefore, the machines which Texas Eastern now has in service can be considered the first centrifugal compressors to be used for the high pressure transmission of gas.

It should be kept in mind that our application is very unique. Our problem was not to start at the beginning to design a complete gas transmission system but rather to take pipelines, pump stations and other facilities which had been constructed to carry the oil and to convert them for use in the transmission of gas in the most efficient and economical way possible.

In other words, we did not design this shoe. We had the shoe. The problem was to make it fit another foot. We selected centrifugal compressors as the best means of converting the oil lines to gas transmission and utilizing as much as possible of the total property which we purchased.

The centrifugal compressor was introduced into this country about 40 years ago, prior to which time all air and gas compression was accomplished with some form of displacement type compressor driven by electric motors, steam engines or gas engines.

New applications of the centrifugal compressor were hard to obtain due to the natural prejudice against any change, but slowly this machine has been adapted from one application to another and from one process to another until today its usefulness encompasses practically the entire field of compression for air and gases. And just as the centrifugal pump before it, this compressor has proven its worth and in most cases has become the accepted standard equipment.

Nearly every application of a new machine or a new idea or a new process requires a special set of circumstances to foster its use. In the spring of 1947 there was only one manufacturer who would discuss the immediate manufacture and delivery of centrifugal compressors for our service. Less than one year later there are at least three and possibly more manufacturers who are in a position to quote early delivery of this equipment.

A history of the special set of circumstances required to pioneer the use of centrifugal compressors for high pressure gas transmission would begin with the Government's decision early in the war to build an unsinkable inland pipeline. The War Emergency Pipeline, Inc., a non-profit organization formed and staffed by various oil companies at the request of the government, designed and constructed these two lines. The 24-inch crude line originated in the vicinity of Longview, Texas, and terminated at Linden, New Jersey. This line was placed in operation in August 1943 with a designed capacity of 300,000 barrels of crude oil per day.

The potential value of this line was so evident that the petroleum administration early in January of 1943 had filed a request with the War Production Board

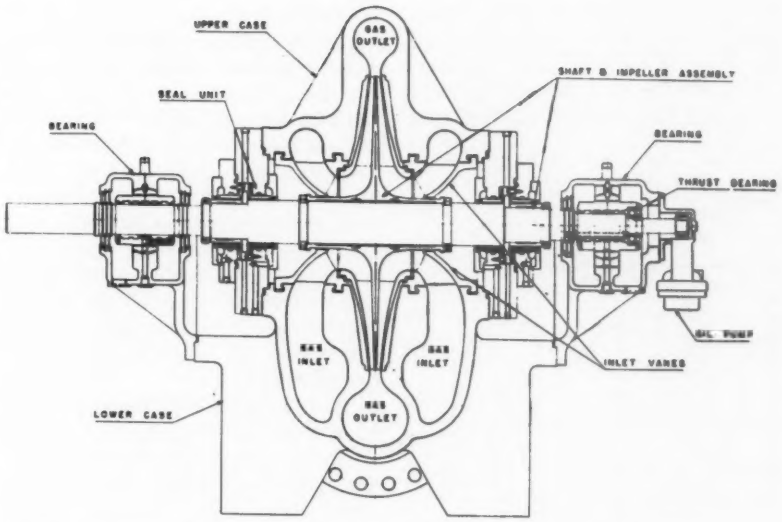
Presented at A. G. A. Natural Gas Department spring meeting, Houston, Texas, May 4-5.

for allocation of the necessary critical materials to construct a products line from the Houston and Beaumont area to the East. This line was 20 inches in diameter and also terminated at Linden. It was placed in operation in March 1944 with a designed capacity of 235,000 barrels of gasoline per day.

Operation of both these lines was discontinued in the fall of 1945 after the cessation of hostilities.

In January 1946 they were declared surplus and the War Assets Administration advertised for bids for their disposal. Texas Eastern was the successful bidder. The government included in the terms of the sale of the property the National Security Provisions providing for its recapture in time of emergency. The purchaser is also required to be able to restore the property within 90 days to service as a petroleum carrier at the same operating conditions, ordinary wear and tear excepted, as existed at the time of the sale.

With the purchase of these lines Texas Eastern was presented with a very unusual problem in the long distance transmission of gas. Here they had a line in place with a definite size, wall thickness, a definite origin and termination. There was a tremendous investment in the oil pump stations that were included with the purchase. Utilization of the facilities purchased to the best advantage was the special set of circumstances needed to provide the centrifugal compressor with an application in the high pressure transmission of natural gas. Additional factors tending to make the use of centrifugal compressors particularly attractive in this instance were the National Security Provisions just referred to.



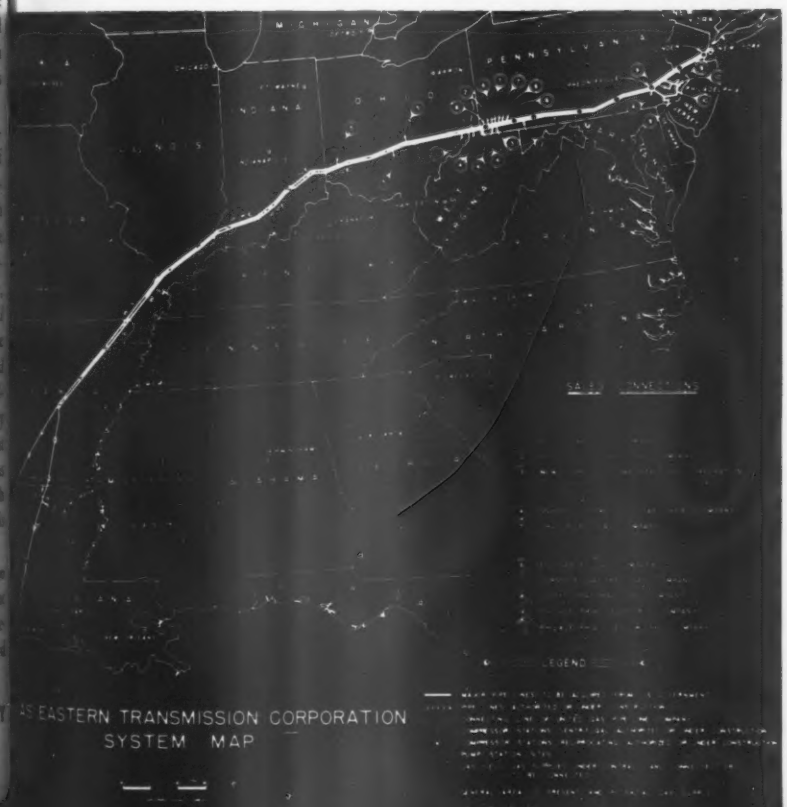
Typical cross section of a centrifugal compressor showing the simplicity of internal construction

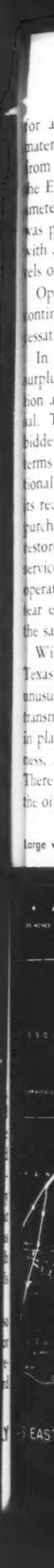
It was while exploring possible utilization of the existing pump stations that we began consideration of the centrifugal compressor. In reply to our inquiries of engine manufacturers regarding delivery of reciprocating equipment for use along this line, a proposal arrived to furnish a centrifugal compressor using an electric drive. This had previously been discussed among our engineers and management and we were therefore very receptive because of the opportunity such a machine presented to better utilize facilities being purchased.

Our investigations into the practicability of the use of the centrifugal compressor on these pipelines developed the following points:

1. Centrifugal compressors had not been used for pressure above 500 p.s.i.
2. They had not been used for long gas transmission.
3. There was some question as to the ability to obtain a satisfactory seal for this service and these pressures.
4. Considerable progress had been made in centrifugal compressor design during the war, both in the techniques of manufacture and the materials that go into their construction.
5. First cost of the compressors and their motors was in line with other compression equipment.
6. Maintenance and operating costs, other than fuel, were estimated to be less than for gas engines.
7. The centrifugal compressor is es-

Large volumes of natural gas are being moved by centrifugal compressors over this pipeline network





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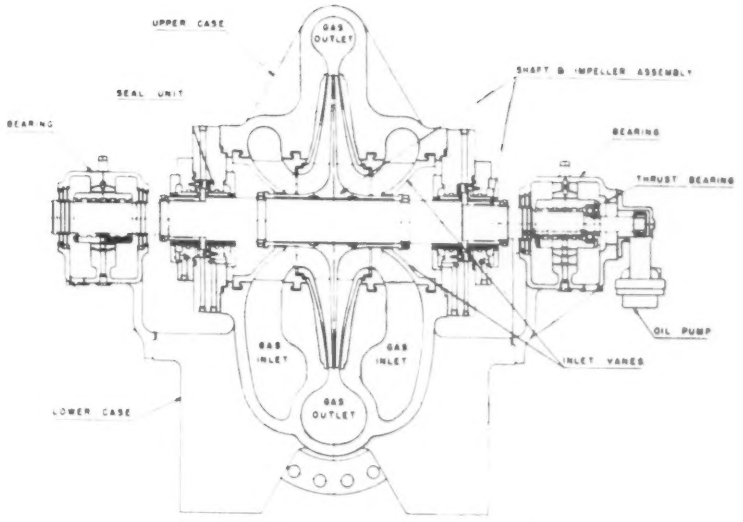

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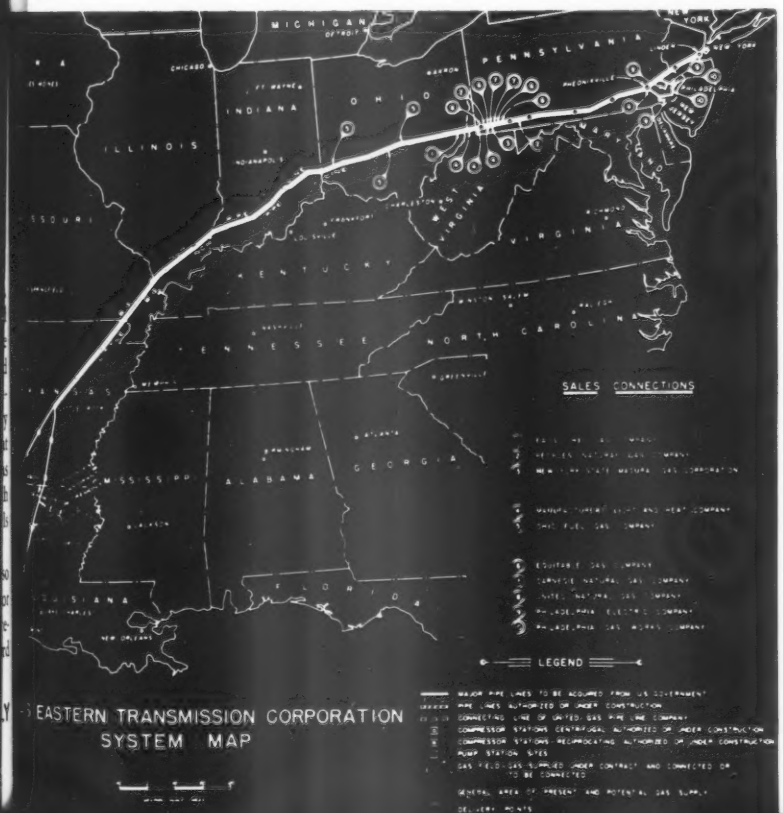
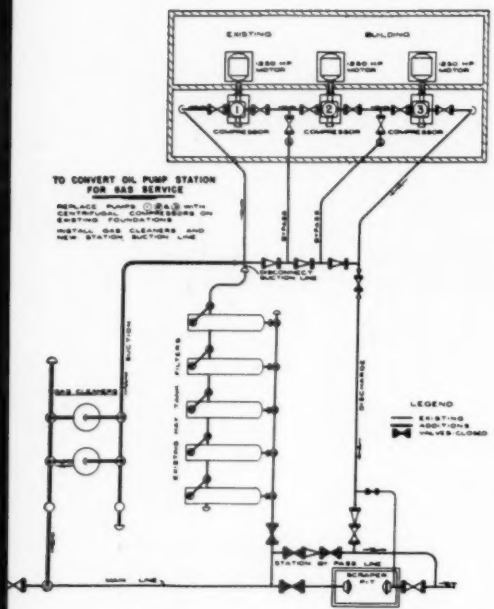




Typical centrifugal compressor station layout

sentially a high capacity machine.

None of the known limitations which we were able to develop appeared incapable of solution and most of the information only served to further strengthen our conviction that the centrifugal machine definitely had a place on this pipeline.

Our economic studies had shown that by using the centrifugal compressor we could naturally deliver more gas to the markets and that the price we could afford to pay for the electric power was in the range of that which the War Emergency Pipeline had paid during the operation of the line for oil service.

After the decision to use these machines was made, other interesting developments enabled the designing of the compressors so that they would be interchangeable with the oil pumps. We could just remove an oil pump and install the gas compressor with no piping changes at all. We are able to use practically all of the facilities which were installed at each station for oil service, and in practically the same manner. The electrical systems installed at all of the stations were naturally one of the factors in the decision to use the centrifugal compressor with electrical drive. Without these facilities the economic application might not have been possible.

By the use of these machines we think we had been successful in making the minimum number of changes in the station piping and electrical facilities, so that the reconversion as an oil carrier can be accomplished quickly in the event that the National Security Provisions are exercised. Most of the changes which we have made with the property consist only of the transfer of motors, switch gear, transformers and large valves from stations not being used for gas transmission to those stations which we propose to convert.

Construction

The centrifugal compressor is unbelievably simple in appearance and size and in its internal construction. As designed for Texas Eastern with a capacity of 225,000 m.c.f.d., the compressors weigh only 6,000 to 7,000 pounds, and are five feet wide, five feet high, and five feet deep, including the length of the shaft. It consists, in general, of a short heavy shaft to which are attached impellers or wheels. The only wearing parts of this machine are the shaft journal bearings, the thrust bearing and some designs of the shaft sealing unit. The reciprocating compressor is a complex machine of many moving parts. The centrifugal compressor contains only a fraction of the number of separate parts which are contained in a reciprocating compressor of equivalent capacity.

By its simplicity, the centrifugal compressor can be expected to maintain a high level of efficiency over a very long life. There is nothing in the equipment which produces the compression that can deteriorate or become less efficient over the years. Maintenance or overhauling of these machines can be done very quickly and easily. No special tools are required. A complete overhaul, dismantling the machine completely and replacing with all new wearing parts, can be completed by two or three men in much less than an eight hour shift.

The physical size of the machines indicates that the foundation requirements would be relatively small. It also follows that the floor space or building area needed would be reduced and that the weight of the building itself would be lessened due to the fact that the cranes which are usually supported by the building would be smaller in size to handle the lighter loads of these units.

Some of the machines being designed for us will handle 225,000 m.c.f. and others are being designed to handle 340,000 m.c.f., yet the overall physical size of each is practically the same. The horsepower requirements are different, but the same compressor can be used for a wide range of horsepower.

Since the first cost is very much the same on the compressor for any horsepower, it follows that the cost per horsepower would be materially effected as greater power is added to the same machine. For instance, our original machines were designed for use with a 1,250 horsepower motor although the shaft and bearings were designed to take a 2,000 horsepower driver. We are now contemplating the replacement of some of the original motors with 2,000 horsepower motors, to accommodate proposed volume increases. No change at all is required on the case or the internal construction of the compressor. Of course, if the operating conditions had been materially changed, some alteration of the impeller would have been required.

The shaft seal is the heart of the compressor and the secret of its success. At the present time our machines are being designed with three different shaft sealing units. Each is very different from the others, but all are expected to be equally satisfactory in operation.

The centrifugal compressor is a large volume machine and has its greatest economic significance on high capacities. Rotating equipment lends itself readily to automatic operation which in turn results in low maintenance and operating costs. Only a small number of units is required at each station to handle the full capacity of the pipeline since all of the gas is handled through each unit.

Operating Characteristics

Perhaps you are wondering why the centrifugal compressor has been so long gaining acceptance for this type of service. The two reasons which retarded its application were, in order of their significance:

1. The economies of the prime mover, and
2. The shaft sealing unit.

As previously mentioned, the sealing problem has very definitely been overcome and therefore the prime mover remains the one big obstacle to universal application of the centrifugal compressor.

The operating characteristics of this machine can best be visualized by reference to characteristic curves. The compressor is essentially a high speed and a high volume machine and has a wide range of capacity variation. In other words, the compressor will produce approximately the same pressure rise over a wide range in capacity down to as much as 50 percent below design conditions. Another characteristic of this compressor is that it is economical in operation at loads less than design loads.

With variable speed, the compressor has a wide range of flexibility in relation to compression ratio, capacity, and intake pressure. It can handle a stream of varying specific gravity with no outside regulation required. The stream does not have to be absolutely clean and dry. Small particles of dust or scale will not effect compressor operation and the abrasion or corrosion will probably not be of any consequence.

No Pulsating Action

The gas is delivered in a steady stream with no pulsations, which is important to good pipeline flow and should also be appreciated by persons interested in measurement. The measuring equipment is not subjected to pulsating action and therefore results in a very smooth curve which is easy to read and calculate.

The power requirement of this machine is almost directly proportional to the volume of gas being handled.

Compression ratio per stage for the centrifugal machine is comparatively small, rarely exceeding 1.2 in practice and most often is in the range of 1.06-1.15. Therefore, production of the ratios with which we are most familiar on pipelines would require four to ten separate stages.

Our own flow studies had determined that with a station spacing of approximately 50 miles the compression ratio would be approximately 1.30. This also proved to be the most economical ratio for our system. We are developing this ratio by using three stages of compression, this also being the same number of stages used for oil pumping.

Comparing the centrifugal machine briefly with the reciprocating equipment, which up to now has been used almost exclusively for the long distance transmission of natural gas, we find that reciprocating units at ratios with which we are familiar, about 1.5 to 1.8, generally have higher efficiencies than the centrifugal. But within the range of application of the centrifugal machine this may be overcome or balanced out by other factors.

The reciprocating unit when operating at constant speed and suction pressure will deliver a fixed capacity at varying discharge pressure whereas the centrifugal machine can be designed to deliver a fixed pressure at almost any capacity while operating at constant speed and suction pressure. The reciprocating equipment is essentially a low capacity machine and is ideally suited for applications which require high compression ratios and small capacities. The centrifugal machine is essentially a high capacity machine and is ideally suited for applications that require low compression ratios and large capacities.

In our own application we have a 1,000 horsepower gas engine producing a 1.3 ratio but handling only 50,000 m.c.f. or one-ninth of the total line capacity. Therefore, nine machines are required. The centrifugal by contrast will handle half the line capacity or 225,000 m.c.f. but only through a ratio of 1.09. Therefore, three machines in series are required to produce the 1.3 ratio, and two sets of three machines are required to handle the capacity, making a total of six units.

As previously mentioned, the greatest limitation remaining in the adoption of this machine to transmission service, is the prime mover. The present installations are using electric motors directly connected to the compressors. These motors are 3,600 r.p.m., 2,300 volts squirrel sage induction type and rated at 1,250 h.p. The electric motors have certain advantages, such as low maintenance, low investment cost, and are easily adapted for automatic regulation. Their greatest disadvantages are in having to provide an adequate supply of power at a reasonable cost and in the constant speed characteristic of the a.c. motors.

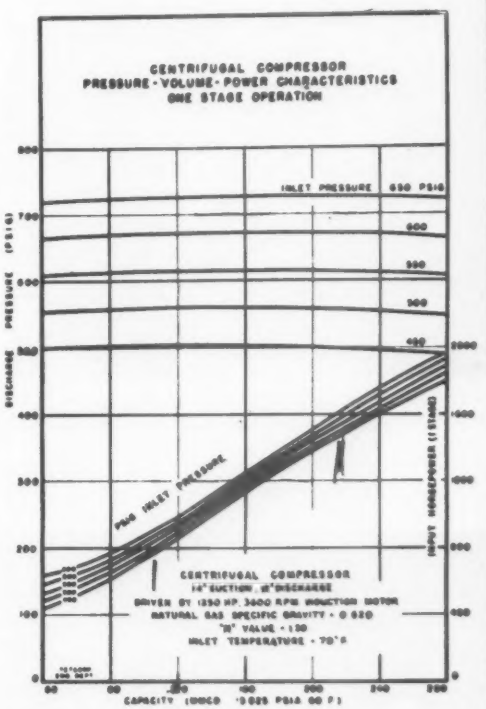
The steam turbine as a driver would provide variable speed which is very desirable but the increased maintenance and operation of the attendant steam plant together with the water requirements necessary present serious objections to its use.

The reciprocating gas engine through the use of step-up gears could be used and variable speed would be present. But here the higher first cost and operation and maintenance expense may not justify its selection. Finally the gas turbine although still in the development stage presents very attractive possibilities, since it would have varying speed and could be built in large horsepowers so that only one or two units would be required per station to handle the full volume of a large capacity system. Very little is known as yet concerning the installation cost of this equipment or the maintenance and operation charges which would be necessary for it.

As in almost any problem, the economics of each application may be different and the prime mover selection would not necessarily always be the same.

Operation

Operation of the centrifugal units can be very simple and practically automatic to infer that the operation of our own units has been simple or automatic, for the reverse is probably true since we are operating our station in parallel with some of the *(Continued on page 50)*


CENTRIFUGAL COMPRESSOR
PRESSURE - VOLUME - POWER CHARACTERISTICS
ONE STAGE OPERATION
INLET PRESSURE 650 PSIG
PSIG INLET PRESSURE
DISCHARGE PRESSURE (PSIG)
INPUT HORSEPOWER (1 STAGE)
CENTRIFUGAL COMPRESSOR
14" SUCTION, 12" DISCHARGE
DRIVEN BY 1250 HP, 3600 R.P.M. INDUCTION MOTOR
NATURAL GAS SPECIFIC GRAVITY = 0.620
"n" VALUE = 1.30
INLET TEMPERATURE = 70° F
CAPACITY (MMCF @ 0.620 SP. GR. 60° F.)

Performance curve for a centrifugal compressor

Big pipelines like the one above are bringing natural gas to many new centers of population

Significance of Ten Years Under the Natural Gas Act

Noted industry attorney fears invasion of regulation into operational spheres which were formerly exercised by management

By WILLIAM A. DOUGHERTY

Attorney at Law
New York, N. Y.

ON June 21, 1938 President Roosevelt affixed his signature to a legislative enactment referred to as the Lea Bill, H.R. 6586, and thereupon commenced regulation by the Federal Power Commission of the transportation and sale of natural gas in interstate commerce. In these final days of the first decade of federal regulation, it is appropriate that we pause to consider these past ten years, not by reciting the detailed list of actions and proceedings marking out the tortuous path of regulatory experience, but by considering broadly the significance of past events. We study the past chiefly because of its bearing on the living present and its promise for the future.

On May 9, 1938 the Natural Gas Department, American Gas Association, met at New Orleans, then as now under the chairmanship of Robert W. Hendee. The meeting had a slogan, "Our Job Is a Selling Job," but then it was the use of gas you were selling, now it is the non-use of gas, at least in the North and East.

Alexander Mahood, a member of the Public Service Commission of West Virginia and then president, National Association of Railroad and Utility Commissioners, in an address commented briefly on the pending bill known as the Lea Bill passage of which was predicted in that session of Congress. Thus for the first time reference was made in the proceedings of A. G. A. to the event which ushered in an era of controversy and litigation, the end of which is not yet in sight.

Today the Commission stands divided on issues of vital importance to producers, transporters, distributors, and consumers of natural gas. This division of opinion became clearly marked in the hearings before the Senate Committee on Interstate and Foreign Commerce. The Commission is divided on the basic question of amending the Natural Gas Act in any respect whatsoever. In this controversy are disclosed the fundamental thinking and regulatory objectives of the individual commissioners. The direction and character of the future of the natural gas industry depend largely upon which of these views prevail.

In order to get the proper perspective let us have a flash back to 1938. At the New Orleans meeting N. C. McGowen, then A. G. A. president, spoke on the subject "Ten Years of Progress," showing how the industry had forged ahead since 1929. Marketed production had increased from 1.31 trillion cubic feet in 1926 to approximately 2.5 trillion cubic feet in 1937. This was accomplished without federal regulation and despite the economic depression of the early thirties. Natural gas reserves were estimated at 62 trillion cubic feet.

Ten years later, total proved natural gas reserves as of December 31, 1947 were 165.9 trillion cubic feet, according to the report of the A. G. A. Committee on Natural Gas Reserves headed by the same N. C. McGowen. Production in 1947 was 5.63 trillion cubic feet, while reserves added were 10.98 trillion cubic feet. The state of Texas alone is credited with 90 trillion cubic feet.

That the slogan of the 1938 meeting, "Our Job Is a Selling Job," has been productive is painfully evident today. Seemingly the appetite for natural gas for house heating and industry use is insatiable. There has been going on in Washington a hearing initiated by the F.P.C. dealing generally with the demands for natural gas by customers of Panhandle Eastern Pipe Line Company and the quantities which Panhandle can supply in 1948. More than 50 distribut-

William A. Dougherty (right) at Natural Gas Meeting in Houston with E. Buddrus (center) and M. K. Hager, Kansas City, Missouri

Address before Spring Meeting, A. G. A. Natural Gas Department, in Houston, Texas, May 4-5, 1948.

ing companies from six states are engaged in what might be described as a "battle royal" for Panhandle gas.

The natural gas industry at the end of ten years under the Natural Gas Act finds itself with market demands it cannot satisfy, needs for pipe it cannot buy, and vast gas reserves in the hands of producers hesitant to sell to interstate pipelines for fear of federal regulation. Verily we are in a dismal morass of criticism, conflict, and consternation.

It cannot fairly be claimed that the Natural Gas Act is the cause of the present predicament. I agree with the statement made in the Commission's report entitled "The First Five Years Under the Natural Gas Act," that the Act "is an effective instrument of regulation." But I do claim that the character of regulation under the Act and the direction in which that regulation now seems pointed has been and will continue to be a dominant reason for the difficulties with which the industry today is struggling.

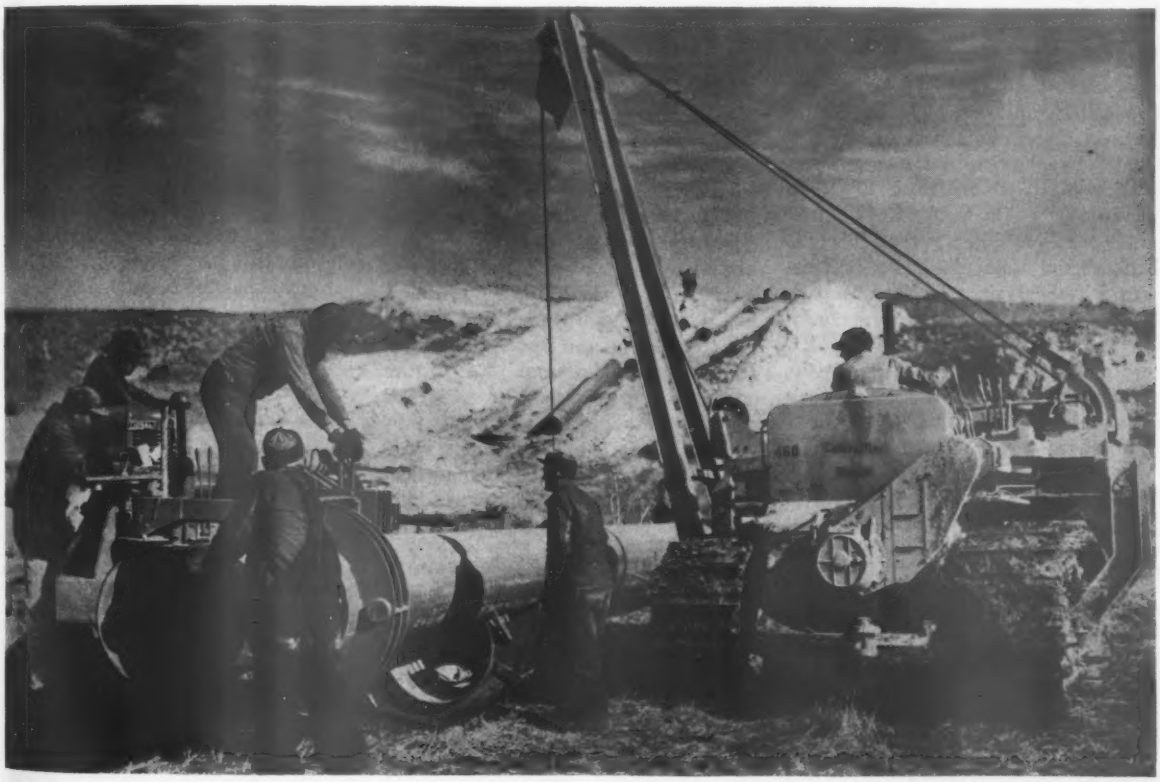
The introductory section of the Olds-Draper report on Docket G-580 states that the Act "had enabled the Commission to put the interstate natural gas business on a sound and expanding basis, with the consumer interests served by large rate reductions and the prospect of still further lowering of the cost of natural gas."

There is no doubt that today the interstate natural gas industry is on a sound and expanding basis, but that accomplishment has been realized in spite of rather than because of federal regulation. In June 1938 we had a healthy, thriving industry which had made tremendous strides in the preceding ten years. The fact is that during 1925 to 1938 all but three of the present large interstate pipeline companies were organized and constructed into their present market areas. During those years the industry acquired such momentum that the past ten years are but a continuation of the start made before regulation.

Since the advent of the Natural Gas Act the only entirely new lines constructed have been the Tennessee Gas Transmission line to the Appalachian area, the joint line of El Paso Natural Gas Company and the California companies from Southwest Texas and New Mexico to Southern California, and the Inch lines which were constructed as oil lines without the necessity of a certificate from the Federal Power Commission. All other construction has been expansion by companies to meet increased demands of their markets served before the passage of the Natural Gas Act.

But when we come to the field of rate reductions full credit must be given to F.P.C. These reductions now approach $40 million annually. The price of gas was reduced below competing fuel costs in many communities. Since the price increases of coal and fuel oil during the past two years, natural gas costs so much less than other fuels that there is no competition. It is self-evident that the rate policies of the F.P.C. largely are responsible for the too rapid growth of the demand for natural gas for house heating and for use by industries, a growth beyond the present ability of the gas companies to supply.

In this field of rate regulation the Commission, with the approval of courts willing to overrule long-established



Modern equipment like cold wrinkle bending machine (left), aids construction of natural gas pipe lines. Picture courtesy Michigan-Wisconsin Pipe Line Co.

Constitutional principles, has made rate history. Long before the Natural Gas Act was passed the Federal Power Commission had been seeking every opportunity to overthrow the principle of fair value in rate making. In cases coming to the Supreme Court of the United States from California[1] and Pennsylvania[2] the Commission had appeared as a friend of the court, urging the adoption of the prudent investment or original cost method. So when the passage of the Natural Gas Act brought complaints against rates the great day had arrived for the Commission's direct action.

First was Natural Gas Pipeline Company of America, and a preliminary order of the Commission was upheld by the Supreme Court.[3] In that case Justices Black, Douglas, and Murphy, in a concurring opinion, deemed the occasion appropriate "to lay the ghost of *Smyth* vs. *Ames* which has haunted utility regulation since 1898." The ghost still appeared when Hope Natural Gas Company won from the Court of Appeals of the Fourth Circuit[4] a reversal of the Commission's order reducing its rates. But came the day when the Supreme Court reversed the Court of Appeals, affirmed the Commission's order, and a new era of rate making was firmly launched.[5] The Hope case created much discussion, principally because of the five separate opinions, including that of Justice Jackson who concurred but criticised the application to natural gas production of the cost formula of utility regulation.

There followed in turn the Panhandle Eastern[6] and Colorado Interstate-Canadian River[7] cases in which was challenged the Commission's authority to include in the rate base at cost production owned by the pipeline company. By the margin of one vote the Commission's authority was sustained. Whenever I think of that case I recall those lines of John Greenleaf Whittier in his poem "Maud Muller":

"Of all sad words of tongue or pen, the saddest are these 'it might have been.'"

Certificates of Public Convenience and Necessity

The Natural Gas Act as originally passed required a certificate of public convenience and necessity for a proposed pipeline only if projected to a market already served by another natural gas company. The Commission in its 1940 annual report recommended extension of the certificate authority over all construction. So there was enacted the present certificate form of Section 7, effective February 7, 1942. The industry lost the right, granted to a natural gas company in the original Act, to enlarge facilities for the purpose of supplying increased market demands in territory in which the company already operated.

During the following four years the Commission's docket became clogged with a variety of applications, the processing of each requiring the time of an examiner, staff members, and company witnesses. In some instances a year intervened between the filing of an application and the issuance of the order granting the certificate. Public hearings were required for the slightest proposed additional facilities, and the coal and railroad people utilized every conceivable method to delay and hamper the extension of natural gas service.

Finally the Commission worked out a shortened procedure[8] which has served well in eliminating delays where the additional facilities proposed are such as not to generate controversy. The Commission's staff is to be commended for the manner in which it has expedited the granting of certificates for minor increases of capacity with little delay and a minimum of time and expense on the part of the applicant.

The long delays experienced in obtaining authorization for construction have had a direct bearing on the inadequacy today of the facilities of many natural gas companies. True it is that there has been and still is a shortage of pipe to meet all demands. But the oil industry has not been hampered by regulatory procedures. It could make a firm contract for pipe at any time. Natural gas companies unable to sign a firm order until the proposed construction had been authorized by the Commission, could not get a position in the schedules of pipeline fabricators until the certificate was granted. The pipe went elsewhere.

A great deal has been said and written about federal control over the ultimate consumption of natural gas. The phrase "end use" is found in much of the testimony given in Docket G-580. Lacking any specific authority under the Natural Gas Act to control the ultimate utilization of gas sold in interstate commerce, the Commission has seized upon the certificate section as a means of accomplishing that end.

The certificate authorizing the acquisition and operation of the Inch lines by Texas Eastern Transmission Company[9] directed specific deliveries of gas to purchasers in lesser amounts than provided for in contracts with Texas Eastern, allocated a portion thereof to customers of Panhandle Eastern Pipe Line Co., and then reserved the right to direct the disposition of the remaining gas. No certificate authorizing facilities of any substantial capacity now is issued without a condition imposed that no gas shall be sold to new customers without specific authorization of the Commission, and in some instances a similar restriction is made as to additional deliveries to existing customers. By this method of regulation the Commission can control the use of gas by refusing to authorize the delivery if the Commission believes gas will be consumed for a nonapproved use.

Proposed Amendments

Commissioner Olds in his recent testimony before the Senate Interstate and Foreign Commerce Subcommittee[10] declared that in his opinion the Commission could regulate the use of gas through its power in granting certificates. A careful reading of the Olds-Draper report on Docket G-580 discloses that those commissioners talk in terms of a national fuel policy and urge that natural gas, the principal mineral fuel resource of the Southwest, be retained in the producing states for future industrial expansion. Thus the Natural Gas Act is to be used as a tool in over-all national planning and the producers in Texas may be prevented from marketing gas to the interstate pipelines.

It is in this field of regulation that we shall experience the broadest developments in the next few years. The extent of valid action under the certificate provision has not yet been tested in court. That there is developing an invasion of regulation into the sphere of operations formerly exercised by management is clear.

This brief resume of the high points of regulation by the F.P.C. under the Natural Gas Act during the past ten years makes clear why the industry has felt that amendments to the Act are needed. *(Continued on page 48)*

Gas Builds a Water Heating Program

Continuous attention to quality and service requirements will protect the industry's large stake in automatic gas water heating load and assure a prosperous future

By F. A. McFERRAN

General Sales Manager, Ruud Manufacturing Co., Pittsburgh, Pa.

F. A. McFerran

THE automatic gas water heater industry has recently completed an accomplishment unique in appliance history. The industry doubled the number of automatic gas water heaters in use in little more than three years. We are grateful for this sudden acceptance of automatic gas water heating. We wish the demand had grown more gradually. There have been many difficult problems, but these have largely been solved, and the industry is now ready and willing to establish new records.

It took the gas water heater industry three years to catch up with the demand, but once the need was recognized there was no hesitancy. New plants were built, old plants were modernized, new manufacturers came into the business. Now that we have the production facilities there is some question if it will all be needed. The demand has fallen off, and there are ample dealer stocks on hand. The prospect for 1948 is that the industry will not equal the production record of last year.

Outlook Is Good

In spite of these conditions, there are reasons to believe that the gas water heater industry has many prosperous years ahead. Our markets are still far from satisfied.

Unfortunately there are no complete statistics to show the number of domestic gas users still without factory built automatic gas water heaters. There are utilities which have as much as 90 percent saturation of factory built automatic gas water heaters. On the other hand, there are still many with less than 25 percent saturation. Based on the known production in past years and allowing for reasonable replacements, it is doubtful whether more than 35 or 40 percent of the domestic users of natural, manufactured, and liquefied petroleum gases are equipped with factory-built automatic gas water heaters.

That means there are still millions of domestic gas users with obsolete water heating equipment. As these water heaters are replaced, it is hardly likely that they will return to the old methods of heating water. Indeed, there is very little of the old type gas water heating equipment available. Almost every retailer of gas water heaters is recommending automatic water heating.

There is another source of demand for automatic gas water heaters which has not yet fully materialized, but will probably be felt soon. If the average life of the automatic gas water heaters in use is ten years, there will be several hundred thousand replacements each year. Large numbers of automatic water heaters are approaching old age. Many of the wartime water heaters will be wearing out before long.

Add to these prospects the new home

Water Heating Campaign Gains Momentum

A PAR activity

TO date 118 gas companies have made plans to participate in the nation-wide automatic gas water heater campaign based on the theme "For Hot Water Magic—Gas Has Got It!" Most of these companies are arranging dealer meetings and merchandising plumber meetings to launch the campaign in their areas. The drive is sponsored by the Water Heating Committee, American Gas Association.

Heavy emphasis is being placed on adequate sizing and upgrading of water heaters and on furnishing dealers and merchandising plumbers with the numerous selling ideas now available from the Promotion Bureau, American Gas Association, and from individual manufacturers of automatic gas water heaters.

One of the first companies to get under way with the "warm-up" campaign was the Utilco Co., Merchandising Division, Cumberland County Gas Co. of New Jersey. This company launched their campaign on April 19 with a dinner meeting at which officials explained the drive, covered company policy on closer dealer relations, presented ideas for improved installations, and discussed sales training points.

The company has also inaugurated a tip system whereby employees turning in prospects who purchase new gas water heaters during the campaign period will earn three dollars for each completed sale and two dollars if the sale is completed within 30 days after the campaign closes.

Results of this system are being carefully watched by the company which hopes to use it on other appliance campaigns. George J. Kirchner, sales manager, reports that the company is also running a series of half-page newspaper advertisements during the gas water heater campaign, and backing it with floor and window displays, point-of-sale materials, give-away booklets, and other promotional matter.

Further details of gas company participation in the automatic gas water heater campaign will be published in coming issues of the MONTHLY.

market and the homes beyond the present gas mains which will be serviced before long. The advent of natural gas in many communities and the expansion of LP-gas service in the rural areas will create new demands for automatic gas water heating. All of these favorable factors add up to a very promising future for the gas water heater industry.

As salesmen, we dislike to cloud an optimistic picture. The immediate prospects are bright, but there are developments within our industry which cause us some concern. We are beginning to wonder if our new found prosperity will be good for the industry five or ten years from today. Have we grown too fast for our future welfare? Are we building our business on firm foundations?

It is unfortunate that better grade water heaters were not available in sufficient quantities during and following the war, but that situation no longer exists and still there are far too many low-grade automatic gas water heaters being sold.

There is also a tendency to reduce the size of automatic water heaters. Many outlets are now offering 20 gallon water heaters for the first time in several years. Too many dealers are still selling small water heaters where larger sizes are really required. The average-size water heater for the building trades is too small for satisfactory service.

New Outlets

The prevalence of low-quality water heaters is not surprising for many new manufacturers have entered the gas water heater business. Some of them build high-grade products. They have had much to do with the industry's new achievements, quality and quantity-wise. On the other hand, many of these new manufacturers have no public acceptance for gas water heaters and little experience in the business.

Ready and willing to sell low-grade water heaters are a host of new dealers with little knowledge of the water heater business. By and large these dealers do not want to sell unsatisfactory merchandise. They simply do not know what qualities are essential to good gas water heating service. It will probably take a few years for them to find out from experience.

A large share of gas water heater merchandising is now in the hands of people who cannot be expected to have too much interest in high quality standards of gas water heating. From the standpoint of a volume of gas water heater sales, it is most desirable to have these outlets. As a matter of fact, the gas water heating industry and the gas industry encouraged widespread dealer merchandising. At any rate they are in the business and the chances are they will continue to merchandise a large share of the gas water heaters sold. If we are interested in upgrading the standard of automatic gas water heating, something must be done to help these dealers.

Serious Competition

The volume of low quality automatic gas water heating might not be such a serious problem were it not for the threat from competing fuels. The gas water heater industry takes pride in the fact that our production reached 1,850,000 units in 1947. During that same

"Darling! You Look Too Wonderfully Well!"
"Let Me Tell You Why, Dear!"
"It's those scrumptious hot baths and facials I've been enjoying lately . . . that's my beauty secret!"
"But tell me more, darling!"
"My dear, it's too divine — our new automatic gas water heater, I mean! Piping hot water baths any time . . . what relaxation!"
FOR HOT WATER MAGIC GAS has got it!
Here's a beauty hint for all the ladies!
Enjoy an automatic gas water heater! Enjoy the economy and all the conveniences, too!
You see, gas is the ideal fuel for water heating. It's the best way to get plenty of hot water . . . at once . . . at any time. What's more, automatic gas water heaters are economical, safe, trouble-free!
So look well...feel well...be well...with plenty of hot, hot water!
PUBLIC SERVICE
See the automatic gas water heaters at your Public Service sales office, at your plumber's or at your appliance dealer's.
A-147-48

This New Jersey advertisement uses a novel approach to tie in with automatic gas water heater drive

period, electric water heaters production reached a total of 1,100,000 units. One cannot but have a healthy respect for such an accomplishment.

It is easy to dismiss the threat from electric water heating by saying that most of their water heaters were not sold in competition to natural and manufactured gas. Much of the increase in electric water heating was due to the scarcity of pipe to extend gas mains and to the shortage of liquefied petroleum gas equipment in the rural areas. There were enough electric water heaters installed in competition with gas to indicate the future possibilities. Electric water heating rates of one cent per kilowatt hour are common. Water heating rates as low as six and eight mills do exist in some communities. Such rates are keenly competitive and if they are possible in one community, they can be expected in others. Gas has the advantage of lower fuel costs generally, but there is no assurance that this will be the case tomorrow.

Gas Has Advantage

The advantage of gas water heating most difficult for electric water heating to meet is the speed of our fuel. Because gas is fast, our water heaters are relatively small and compact. This gives us the advantage of lower initial cost for equivalent service. It eliminates problems of space.

Because gas is fast, our hot water service is flexible. A reasonable sized gas water heater can quickly provide varying quantities and temperatures of hot water to meet changing requirements. If the requirements for adequate hot water service are properly understood, it would seem improbable that electric water heating could be sold in competition to gas and yet the fact is they are being sold in too great quantities for comfort.

Speed advantage of gas for water heating is fully understood by our competitors and every effort is being made to overcome that advantage.

Gas water heating cannot afford to rely on the speed of its fuel alone to retain the water heating load. This is the time our advantages will probably be at their peak. We should make certain that these advantages are fully recognized. If we are wise, we will establish a standard of gas water heating that is difficult for competition to meet. If we value the future of our gas load, we will sell gas water heaters which will remain in use for a long time to come.

The fight for adequate sizing of gas water heaters must continue. A great deal of progress has been made but, with increased competition, it is only natural to expect some lowering of the resistance to undersizing.

Limited hot water service is not characteristic of gas water heating. It is characteristic of our competition. It would be a mistake for gas to promote limited hot water service. The transition to some other fuel will be easier for the customer who is budgeting the use of hot water. The reputation of our fuel is dependent upon a plentiful supply of hot water. Such a reputation cannot be enhanced by widespread undersizing.

Automatic gas water heating has much to gain by a public consciousness of the importance of temperatures to adequate hot water service. No other fuel can furnish temperature selection quite so easily.

Top requirement for automatic gas

When you sell an AUTOMATIC
GAS WATER HEATER of good make,
properly sized...
YOU'RE SELLING:
1. ECONOMY—The far higher recovery capacity of the modern "gas automatic" assures an operating economy-ratio in favor of gas of at least 2-to-1. In addition to this saving, your customers enjoy exceptional freedom from upkeep expense.
2. DEPENDABILITY—Gas fuel is "always there" in the pipes. Service interruptions are so rare as to be practically unknown.
3. SATISFACTION—Scientific sizing means that "hot" faucets will never run cold; there'll be plenty of hot water for every use, including automatic laundry machines and dishwashers. Proper sizing means fewer complaints, too—good will for you!
THE PACIFIC COAST GAS ASSOCIATION
The West Prefers
GAS
Better · Quicker · Cheaper
MAKE THIS CHART YOUR GUIDE
GAS WATER HEATER
SIZING CHART
for Abundant Automatic
HOT WATER
APPROVED BY PACIFIC COAST GAS ASSOCIATION WATER HEATER COUNCIL INCLUDING ALL PACIFIC COAST UTILITIES AND MANUFACTURERS.

Proper sizing, emphasized in this P.C.G.A. advertisement, is important point in nationwide campaign

water heating today is a standard of quality of construction which will give satisfactory service over a reasonable period of time. The worst thing that can happen to the gas water heating industry is a widespread breakdown of our equipment. The reputation of our service would suffer and the door be open for competition from other fuels.

The gas water heater industry should take a tip from its own past experience. The first automatic gas water heaters were sold by and large when the old water heating equipment failed. That was the time when the customer evaluated the old service and if it was found sufficiently wanting, or we could make automatic gas water heating sufficiently attractive, we made the sale. Human nature has not changed. The same thing will happen if present day automatic gas water heaters break down.

Quality standards for automatic water heating are not to be feared by the gas water heating industry. Actually they would be an advantage to gas.

Stakes Are High

The gas water heater industry cannot afford to risk the future welfare of its business by the widespread sale of inadequate and poor quality equipment. Many of us have spent our business lives in the industry. We have a large capital investment of our own and our stockholders' money. Recently this capital investment has been increased considerably to meet the new standards of demand. Anything that constitutes a threat to our future, however remote, is a matter of serious concern.

The stake of the gas water heater industry is considerable, but it is small indeed as compared with the stake of the gas industry in the water heating load. In many respects gas water heating is the backbone of the gas industry. Not only does it account for hundreds of millions of dollars in annual revenue, but it is an important factor in the retention of the balance of the domestic load.

Today the gas industry is preparing to make huge investments for increased fuel supplies to meet new domestic demands and to extend the house heating load. To be truly profitable, the house heating load must be balanced with as much year round domestic load as possible. Gas water heating is the greatest single year-round domestic load. Whatever happens to gas water heating is of importance to all gas services.

Responsibility for the welfare of gas water heating rests with the water heater manufacturers and the gas industry. Both industries are alive to their responsibilities. Our respective trade organizations cooperate constantly to promote the welfare of gas water heating and improve our service to the public. Many persons in both industries unselfishly devote their time and talents toward the achievement of these objectives. A great deal has been accomplished.

Functional requirements for gas water heating are established at the highest practical levels and they are rigidly enforced. Promotional activities are extensive and have been very effective in helping to establish better standards and greater acceptance for gas water heating. These activities will continue, and we are confident that our trade organizations will do everything within their power to uphold high standards.

Manufacturers individually have also done a great deal to establish better standards for gas water heating. Products have been improved and new developments have been introduced to meet changing conditions. Educational and training work has been done in the field. There is more product advertising than ever before.

Organized effort on a national scale is fully effective only if it has the support of local merchandise outlets. In the final analysis gas water heating standards in any community are dependent on the activities of the manufacturers' representatives, the retailers, and the gas utility in each community. If enough of them believe in good standards and promote them, a satisfactory level of gas water heating can be established and maintained.

Utilities Must Lead Locally

In most communities leadership in the fight to maintain satisfactory standards of gas water heating must be assumed by the gas utility. The utility has more at stake than anyone else. It is best equipped for the task and it has a great deal of influence on public opinion.

There are many gas utilities doing a splendid job of promoting satisfactory standards of gas water heating. There is also an alarming lack of activity on the part of others. We are well aware of the reasons for this inactivity. Production and operating costs are high. Dealers are selling a satisfatcory volume of automatic gas water heaters. Public relations are often best served by dealer merchandising. But experience indicates that the level of gas water heating quality generally falls without utility support. It is not altogether a question of what the utility can afford. Often it is a question of what the utility can be without.

Utility merchandising is not always essential to good water heating standards in a community. Dealer cooperation is essential and it cannot be effective with half-way measures. If the utility is not willing or cannot merchandise, it should assist those who take over its responsibilities for upholding water heating standards in the community.

Recognize Conditions

What these water heater standards should be is up to the utility to decide. A grade of water heater which will give good service in one community will not give good service in another. A capacity that is adequate in Florida is generally inadequate in Maine. You know or should know the conditions in your community. The standard should be high enough to insure customer satisfaction with automatic gas water heating.

Establishment of satisfactory gas water heater sizing can only be brought about by public understanding of the requirements for adequate water heating. Never in our history have we had such a good story to tell about hot water requirements. Never has there been so great an acceptance for that story. Washing machine requirements, dishwashing requirements, temperature requirements, household requirements, health requirements, all are reasons for adequate sizing. They add up to a recipe for an automatic gas water heater.

Public understanding of these requirements must be backed up by dealer endorsement. We hold no brief for any method of securing such dealer endorsement. It can be brought about by education. It may be established by the profit appeal. Much has been accomplished by the Pacific Coast sizing chart now adopted by the American Gas Association. It is not perfect. Sizing is still a matter of individual requirements, but the chart is simple, and simplicity is often very effective. We recommend its use as a part of your program to uphold proper sizing in your community.

Quality water heaters are sold only

where there are satisfactory merchandising outlets. Sufficient promotion of quality water heaters in any community upgrades the average quality of water heaters sold. It is not always easy to find merchandising outlets that are willing and able to sell quality merchandise. Manufacturers of quality water heaters should be encouraged to be active in your community. They should be encouraged to advertise their products. There is no better way to establish public consciousness of the need for quality.

No program for gas water heating promotion would be complete unless it included the sale of adequate equipment for all hot water requirements including commercial and industrial. It is almost essential that the utility provide sales and engineering help in that field. The dealer should not be overlooked. He can influence and often sell volume water heating in quantity.

We recently took part in a conference designed to promote the sale of volume water heating. The utility was not selling gas for house heating, but had sufficient fuel for volume water heating. There were many apartments in the city using oil and coal heating equipment for water heating. Since the cost of these fuels had increased, it was felt that it was a good time to convert the water heating load to gas. To enlist the aid of dealers, the following plan was worked out:

Utility engineers would survey the apartments in the city. When prospects were interested, they would contact the owner's plumber. Together the utility and the dealer would draw up a proposal that included the reasons why gas offered advantages for water heating, an estimate of the operating cost, descriptive material for the equipment recommended, and a drawing of the proposed installation. Such a proposal was superior to anything the dealer could provide. It had the dealer's endorsement and active support in making the sale.

No matter what your program is, we urge that you make it as complete as possible. The future of gas water heating is in no small measure in your hands. The dangers we have described may be remote in your community, but they are none the less real. The solution to our problem is the old one of good quality and fair service. They are dependable foundations for any business and there is no reason that the gas water heater business should be an exception.

Industrial Relations Round-Table

Prepared by A. G. A. Personnel Committee

● **In a recent survey** among employees of the Koppers Company, 7,100 employees indicated their ranking of the factors they consider important in their jobs. Of the total replying, 62 percent ranked a steady job or stability among the first five items listed; 36 percent ranked it first. Fifty-three percent ranked "pay rate" among the five most important subjects, but only seven percent signified their belief that it ranked above all other considerations. Forty-two percent placed "a chance to get ahead" in the first five, and seven percent thought it most important of all. The high value placed by employees on Job Security is also brought out in a bulletin entitled "Factors Affecting Employee Morale" published by the National Industrial Conference Board on April 9, 1948. These findings should be of interest in the gas industry where, generally, a high degree of job security prevails.

● **The Personnel Committee, American Gas Association,** is active in a number of matters important to the industry. The following undertakings are currently in progress:

(a) Modernization of correspondence courses formerly available from Columbia University and University of Kansas is in progress. Necessary revisions are being undertaken by the Gas Institute in Chicago.

(b) A study is being made of the extent of absenteeism and its current trends in the gas industry.

(c) A series of tests to determine aptitude for meter reading has been developed and will soon be the subject of an article in the MONTHLY, which will point out their availability and the proper procedures to be followed in using the tests.

● **Watchmen may not be eligibile** to be included in a bargaining unit with other employees, according to a decision of the N.L.R.B. in the C. B. Hill case.

● **How the Mississippi Power & Light Co.,** Jackson, Miss., trains supervisors for managerial responsibilities is the subject of an interesting article in the March issue of *Southern Power and Industry.*

● **"The Fair Employee Practices Scheme"** is the title of an article by Donald R. Richberg, in the April 22 issue of *Public Utilities Fortnightly.* Mr. Richberg, long regarded as a progressive liberal, was author of the Railway Labor Act and co-author of the Norris-LaGuardia Act and the National Industrial Recovery Act. His positive and clearly-expressed views should be interesting in the light of existing legislation in several states and in several municipalities (Philadelphia is the latest) not to speak of Senate Bill No. 984, current in Congress.

● **Early in the year,** J. P. Fleming, Ebasco Services, Inc., New York, N. Y., presented a paper to the personnel section, Southeastern Electric Exchange, on the subject "Conditioning Employees for Retirement." Since there is very little available literature on this important subject, it is felt that the article might be of interest to personnel men in the industry. Copies of the paper will be supplied on request to Mr. Fleming.

● **The Bureau of Labor Statistics** has started another study of wage structure in the gas utilities. Field representatives of the Bureau are now visiting member companies to obtain data which, in addition to wages, will include such items as sick leave, vacation practices, and other "fringe" matters. The first study was distributed to A. G. A. company members earlier this year.

● **Industrial and labor relations** in recent years has developed its own language or jargon. Fulfilling an apparent need is a booklet defining terms commonly used, prepared by the Industrial Relations Center, University of Minnesota. It is entitled "Industrial Relations Glossary" Bulletin No. 6, and is priced at 75 cents. It may be obtained from the University of Minnesota Press, 10 Nicholson Hall, Minneapolis 14.

● **In a new personnel administration program** recently developed by the General Electric Co., foremen are serving as "salesmen," responsible for selling the employees' jobs to them as "Customers." G. E. found that nine factors must be present in every job. They are (1) suitable and fair compensation, (2) working conditions which are good and which are subject to constant improvement where possible, (3) supervision which is not only competent technically but in the leadership and counseling sense as well, (4) job security, (5) respect for employee dignity, (6) guaranteed opportunity for promotion when it is justified, (7) complete information on management operations and policies, (8) belief in the importance of individual jobs and their contribution to the economy as a whole, and (9) job satisfaction and a sense of accomplishment. The foremen

(Continued on page 35)

Research at Work

Newly appointed chairmen to direct Technical Advisory Groups for Gas Cooking and Central Gas Space Heating Research

Dr. F. J. Port

W. M. Myler, Jr.

DR. FREDERICK J. PORT, general superintendent, Cribben & Sexton Co., Chicago, Ill., has been appointed chairman, Technical Advisory Group for Gas Cooking Research, American Gas Association, and William M. Myler, Jr., chief engineer, Janitrol engineering department, Surface Combustion Corp., Columbus, O., has been appointed chairman, A. G. A. Technical Advisory Group for Central Gas Space Heating Research, according to an announcement by R. J. Rutherford, chairman, A. G. A. Committee on Domestic Gas Research. Dr. Port and Mr. Myler have both previously served as members of their technical advisory groups.

The gas cooking research advisory group is actively supervising research projects in broiler design features and radiant energy for broiling, and research in design features which affect gas oven performance, particularly the distribution of heat at different temperatures, with varying oven loads and varying types of oven utensils. These projects are of particular importance at this time because of the increasingly high standards of performance that are required of gas ranges.

Other active cooking research projects which are being supervised by the cooking technical advisory group include an investigation of home humidity control which is an important subject because of the tightness and smallness of houses now being built. Under this project, quantitive determination is being scientifically made of moisture generated in homes from all sources, extending from cooking vapors to vapors from shower baths. Excessive moisture causes condensation on windows and walls, but it is believed that moisture in homes which is traceable to the use of gas appliances is considerably less than has been stated in some influential quarters.

The research in home humidity control is an extension of work this group is supervising in methods of kitchen ventilation. Research Bulletin 40 has been published and the final kitchen ventilation bulletin will be published this summer.

Another interesting project of the cooking group is a study directed toward lowering the height of gas range grates. This is essentially a matter of disposing of the products of combustion with low grates without interfering with normal combustion, ignition, and heat transfer.

Current projects being supervised by the Technical Advisory Group for Central Gas Space Heating Research, of which Mr. Myler has been appointed chairman, are directed toward advancing the level of gas utilization in the central heating field. One of the fundamental projects of this group is the determination of heat transfer data for central gas heating furnaces. There are considerable scientific data on heat transfer in general and on boiler heat transfer, such as power boilers. However, there is a technical void with respect to reliable data on transferring the heat from gas flames to the air passing through gas furnaces on its way to heat rooms upstairs. It is believed that the development of such data will lead toward gas furnaces of the minimum possible sizes and maximum possible heating capacities.

This group has also attacked the problem of corrosion of gas appliances, particularly corrosion in central heating appliances. This is a major problem, particularly where sulfur is present in the gas, and concerns corrosion from products of combustion in both the vapor and liquid phases. As in the case of heat transfer, there are considerable general technical data on corrosion but very limited data on corrosion from products of gas combustion. As new data of this specific nature are developed it is expected that rates of corrosion can be arrested with vast savings in replacement of parts and reduction of servicing and repair costs.

An important undertaking being supervised by the central heating research group concerns a problem posed by modern architectural practices in small homes. The space allowed in most new homes for the house heater has been reduced to ridiculous proportions, in many cases only the closet-like space under stairways is available. Serious problems of ventilation, combusion, wall temperatures, have arisen and are being systematically run down and solutions offered.

Studies Continue

Another project which has been brought about by the need for meeting changing conditions in the future, is an intensive study of the performance of central gas heating appliances when operating under conditions of reduced heat output. The greater emphasis on modulated temperature control, and the strides being made toward eliminating "cold 70°," have made it imperative that full knowledge be obtained on the detailed performance of house heating furnaces and boilers when working under these advanced conditions which will become more prevalent in the future.

The work of these two groups is typical of that of all six technical advisory groups of the Committee on Domestic Gas Research. In addition to active research projects being carried on, continuous studies are conducted in advanced utilization technology, which furnishes a firm foundation for new research projects.

Reconversion

● "American Legion Magazine" reminds us that the old slogan of GI's in basic training has been changed. Formerly it was:

"If it moves, salute it.
If it doesn't move, pick it up.
If you can't pick it up, paint it."

Recently, Attorney General Tom Clark told a group of veterans that the new regulations are:

"If it cries, change it.
If it's on wheels, buy it.
If it's hollow, rent it."

Radiants Aid Broiler Performance

Study of clay, nichrome wire, and solid metal radiants in experimental gas range broiler opens vistas for improvement

By H. J. HENSE

American Gas Association Testing Laboratories

● **This is the second of a series of three articles on range design technique. All are based on recently completed projects sponsored by the Committee on Domestic Gas Research, American Gas Association, and reported in Research Bulletins 47 and 48 (prices $1.75 and $2.50 a copy, respectively). The complete series is as follows: I. Separate High Broilers, II. Radiants for Broilers, III. Factors of Oven Performance.**

POSSIBILITIES of improving gas range broiler performance through use of radiants in connection with separate broiler burners appear to be excellent from a technical standpoint. Experimental effects of three types studied at the A. G. A. Testing Laboratories as part of Domestic Gas Research Projects DGR-2-C, DGR-3-C and DGR-5-C, indicate that radiants could be employed to advantage in many instances provided that designs are developed which will meet field conditions as well.

In an effort to extend the information available on the subject, clay, nichrome wire, and solid metal radiants were employed in an experimental broiler. These met existing standards for performance and in general did not alter the general broiler design relationships discussed beginning on page 13 of the May MONTHLY. When design features such as size of flue outlet and location of burner with respect to the top of the broiler compartment remain constant, performance appears to be related to the weight, width and angle of placement of radiants.

Radiants were used in conjunction with a conventional rectangular type partially aerated burner having an hourly input rating of 14,000 B.t.u. The burner, a rectangular, partially aerated type (No. 1 of the four illustrated in May) is shown in Figure 1 with clay and wire radiants attached.

Six clay radiants, three mounted on each side with a length of 15 inches, were used in six separate combinations varying from 0.230 to 0.75 pounds per radiant. Variations in width ranged from 1.75 to 5.25 inches. These combinations were used in establishing primary relationships for weight, width, and angle of placement.

Nichrome wire and metal plate radiants were constructed on the basis of data obtained with clay radiants so that their performance could be compared. The nichrome wire radiants were formed from 24-gauge wire and were similar in shape and size to the clay radiants. The metal plate was constructed of 16-gauge steel. It was 14 inches long and extended three inches on either side of the burner.

Figure 1. Rectangular, partially aerated burner with clay and wire radiants attached

To evaluate broiler heat distribution, iodine-impregnated asbestos sheets, marked off in inch squares, were placed

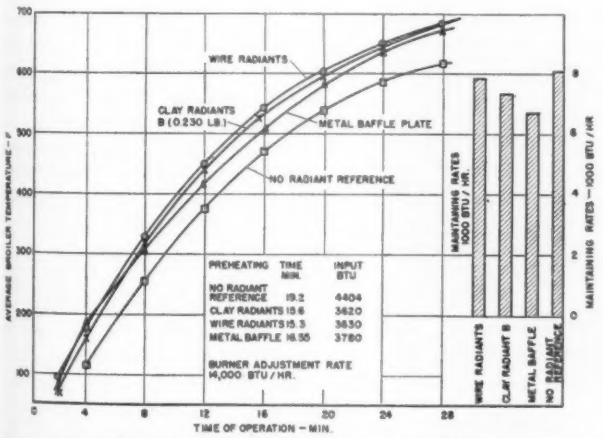

WIRE RADIANTS
CLAY RADIANTS B (0.230 LB.)
METAL BAFFLE PLATE
NO RADIANT REFERENCE
PREHEATING TIME MIN. INPUT BTU
NO RADIANT REFERENCE 19.2 4404
CLAY RADIANTS 15.6 3620
WIRE RADIANTS 15.3 3630
METAL BAFFLE 16.56 3780
BURNER ADJUSTMENT RATE 14,000 BTU / HR.
MAINTAINING RATES 1000 BTU / HR.
WIRE RADIANTS
CLAY RADIANT B
METAL BAFFLE
NO RADIANT REFERENCE
AVERAGE BROILER TEMPERATURE - F
MAINTAINING RATES - 1000 BTU / HR
TIME OF OPERATION - MIN.

Figure 2. Comparison of preheating characteristics and maintaining rates for light clay, wire and metal plate radiants with a no radiant reference condition. Maximum reduction from reference condition was 18.8 percent.

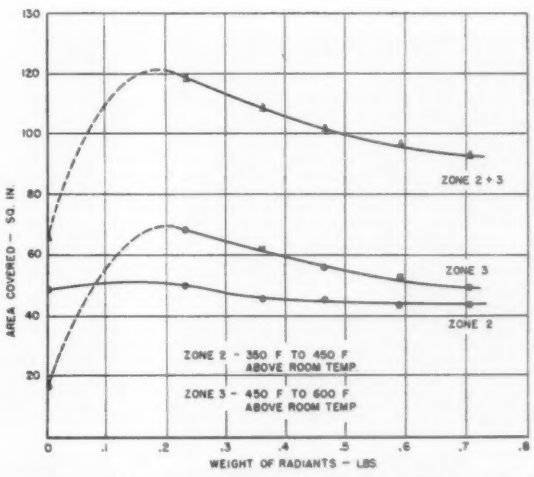

ZONE 2 + 3
ZONE 3
ZONE 2
ZONE 2 - 350 F TO 450 F ABOVE ROOM TEMP
ZONE 3 - 450 F TO 600 F ABOVE ROOM TEMP
AREA COVERED - SQ. IN.
WEIGHT OF RADIANTS - LBS

Figure 3. Effect of weight of radiants on heat distribution

two inches below the burner ports. This method gave three distinct heat zones distinguished by color changes. It offers possibilities for yielding more accurate and reproducible results than the toast test commonly employed. Heat zones thus established were as follows: Zone 1—less than 350 F above room temperature. Zone 2—350-450 F above room temperature. Zone 3—450 F or more above room temperature.

Results of the study are summarized in Table 1 at the end of this article. It will be noted that the lightest clay radiants gave the best preheating as well as heat distribution performance, and that wire and metal plate radiants closely followed this trend.

Preheating time required to raise boiler temperature to 530 F above that of the room varied from 15.6 minutes for the lightest clay radiants to 17.5 minutes for the heaviest. Comparison of light clay with wire and plate radiants as well as with a no radiant reference condition is graphically shown in Figure 2. Maximum reduction from the reference condition was 18.8 percent. The experimental no radiant reference, however, should not be considered as representative of contemporary equipment.

Outstanding performance gain recorded was for broiler heat distribution. Figure 3 charts heat distribution of clay radiants for the two higher heat zones established, separately and combined. This clearly shows a marked rise in area of heat distribution for the combined zones from the no radiant or zero position on the left to the position of the first or lightest radiant at the end of the dotted section of the curve. Maximum increase occurs on the Zone 3 curve, 16.6 square inches falling within this zone at the no radiant reference point, while the first position covers an area of 68.2 square inches, an increase of 311 percent.

The Zone 3 heat distribution curves for wire and metal plate radiants were of similar magnitude to that for clay radiants, 72 and 75 square inches being obtained respectively. Zone 2 areas were 55 and 85 square inches for wire and plate types, somewhat greater than 50.1 square inches produced by light clay radiants.

Maintaining gas rates for all three types of radiants followed a trend opposite to that established for preheating time and heat distribution. While differences in maintaining rates were not large, the heavier radiants produced the lower rates. This trend is seen charted at the right of Figure 2. The metal plate produced the lowest rate similar to that for heavy clay, the respective rates being 6,696 and 6,915 B.t.u. per hour. Rate for light clay radiants was 7,380 B.t.u. and for wire radiants 7,840 B.t.u.

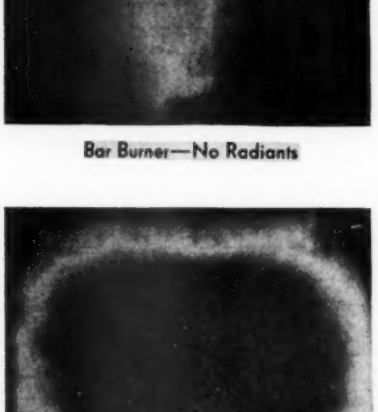
Radiants placed as close as $1\frac{1}{2}$ inches above burner ports were found in most instances to operate satisfactorily as far as combustion was concerned up to 1.25 normal gas pressure. Hence this distance was used throughout the study. Likewise a horizontal position for radiants proved best from the standpoint of preheating time which was chosen as a criterion of other design factors.

Width of radiants was found to affect decreases in preheating time and maintaining rate and increases in heat distribution as they were enlarged up to 2.75 inches. Beyond this size, essentially no change took place at 14,000 B.t.u. input. Since it was felt that this condition depended on the relationship of burner flame length to radiant width, additional tests were conducted at other input rates. A ratio of radiant width to flame length of 2.69 was computed as optimum.

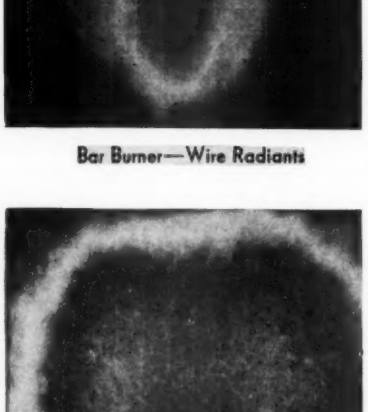
In order to observe effects of changes in burner design, nichrome wire radiants were employed in conjunction with bar, square, and rectangular drilled port burners at various gas input rates. Shape and number of ports of the burners appeared to have no appreciable effect on preheating time. However, changes in shape of the burner did vary the heat pattern of effective broiling area. The hottest areas for the bar and square burners were located more nearly in the center of the *(Continued on page 48)*

Bar Burner—No Radiants

Bar Burner—Wire Radiants



Square Burner—No Radiants



Square Burner—Wire Radiants

Figure 4. Heat distribution patterns for bar and square burners with and without wire radiants

Collections by Group Agency Plan

E. N. Keller

By E. N. KELLER*

Manager, Customers' Accounts Division
Philadelphia Electric Co.,
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IN ancient times, houses of commerce employed not just one "moneyman" but several whose duty it was to collect the money owed their employers. Often such assignments were fraught with peril and required not only a quick brain but plenty of brawn as well. We have come a long way since those days. The procedure has reversed itself. Today, the individual who owes the money takes the initiative to pay it and the collecting is done by what might be termed "remote control."

The Group Agency Plan of collection might be called "The Remote Control System." It involves a single contract with a reliable nationally known organization controlling a group of agents, rather than contracts with each individual agent direct. Seventeen years ago Philadelphia Electric Company adopted such a plan and it has been highly successful. The company serves a territory 1,550 square miles in area with 985,000 customers. This territory comprises the city of Philadelphia furnishing electric service to 560,000 customers and adjacent towns and rural sections serving 425,000 gas and electric customers.

In 1928 Philadelphia Electric Company serving the city of Philadelphia merged with certain subsidiaries of The United Gas Improvement Company which served the surrounding counties. The two groups, because of the difference in type of territory, had different collection problems.

It was an old practice in the companies in suburban areas to have not only branch offices, but also a number of collection points in small towns and villages where offices did not exist. These agencies generally were banks and the privilege was sought for by the banks without thought of compensation. Therefore, the practice of having this free facility grew with the years and at no expense to the company—other than the carrying of numerous small bank balances.

This practice was in contrast to that existing in the city of Philadelphia where there was no such service and the only facilities were in the form of branch offices.

In the late 1920's and early 1930's there was a considerable amount of insistence on the part of neighborhood businessmen's associations that the company open payment offices in various parts of the city. Realizing that this would be a dangerous practice to start, it became quite evident to management that something had to be done to cope with the suggestions. While the businessmen's associations were interested from the standpoint of building up their own communities, their line of argument took the form of trying to illustrate the need for places at which customers could pay their bills at points nearer their homes than the various offices of the company.

Another problem existed in most commercial offices in that on certain days, such as Saturday morning and Monday, the crowded conditions at the cashiers' windows taxed facilities to the utmost.

After a thorough investigation of all angles, the Group Agency Collection Plan was adopted. This plan calls for the customer to pay a fee of five cents, two cents of which is retained by the agent and three cents goes to the contractor. All of the stubs collected are transmitted by the agents to the office of the contractor where they are assembled by accounting districts and dispatched to the central office of the utility company with check to cover. This is done daily. From that point they are dispatched to the various accounting offices in the same fashion as those that are collected in the central office of the utility for its various accounting offices. The agents do not remit daily to the contractor. This money is collected by the contractor's representative weekly so that, in reality, the contractor advances the money which the agents are holding.

Element of Chance

Without due consideration of the facts, it might seem a disproportionate split of the five-cent fee—that the man who presumably does the hardest part of the work gets only two cents while the contractor gets three cents. Actually, however, the cost of accumulating and tabulating the stubs, of sending collectors for the payments and continuously instructing and keeping control of the agents consumes a considerable portion of the three cent fee.

In addition, the system cannot work without some direct losses to the contractor. Very often some of the agents appointed do not have a sufficient credit standing to be acceptable to any bonding company. Therefore, there is an element of chance in the appointment of some of these agents and resultant loss when they go out of business and fail to make good to the contractor. When this happens, it is often a sizeable amount in any one case. Therefore, the risks that are taken and the work that is done justify the split of the fee in the proportions given.

As further compensation, the agent is reimbursed for the postage that he uses to

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*Past-Chairman, Accounting Section, American Gas Association.

Presented before Accounting Section, New England Gas Association in Boston, Mass., February 17, 1948.

send the stubs to the contractor's home office. In addition, the contractor furnishes practically all of the advertising matter which the agent uses, such as display cards, circulars, etc. In many instances, the contractor pays for door-to-door delivery of advertising material bearing the name of the agent and the contractor. In other words, the fee that the agent receives is practically net; whereas, the contractor's three cents is reduced by many factors.

At the start of the system, various notices were inserted with the bills, in the name of the contractor, calling attention to the introduction of the system and listing the locations. There were several hundred locations at that time. The agencies were in drug stores, insurance offices, hardware stores, and many other various types of businesses. Of course, the agents were not confined to the acceptance of electric bills but were also equipped to sell money orders for which they received a fee.

It is pertinent to say here that some of the advertising matter which was enclosed with bills was financed partly by the utility and partly by the contractor.

Good Business

Many of the agents appointed take on the work not so much for the amount of money they get from the operation as for the influence it has on their general business transactions. A druggist, for example, feels that he draws a number of people into his store by way of bill payments whom he would not otherwise have as customers, and, incidentally, sells them something even though it may be only a package of chewing gum. This is especially true where there are two stores within several blocks of each other, because one feels that he has an advantage if he can secure the agency.

The plan offered the customer the opportunity of paying his bill for a fee of five cents in contrast to the transportation cost of ten cents then in effect. It was accepted quite generally and within a comparatively short time grew to the point where 40,000 or 50,000 bills were paid each month to the agents. It did not grow much beyond the 50,000 mark until some years later when another local utility also adopted the plan and many new agents were appointed in types of businesses not previously covered—in plumbing establishments, for example.

The payment of one utility service bill at an agency almost invariably established the customer in the habit of paying the other utility bill at the same place—even though the two bills did not always become due at the same time. This, in itself, raised the figure to 70,000 or 75,000 accounts per month. It remained at this point for some years until it was believed it could be built up by some intensive advertising activity directed at the delinquent customers.

To this end the list of delinquent customers for each accounting office was given to the contractor and he mailed a postcard advertising notice of the facilities available. This was done several times in the past six or eight years, coupled with issuance of general circulars with the bills listing the agencies available, until at this date the number of bills collected is about 125,000 per month. This represents over 15 percent of total bills rendered.

At this time there are approximately 575 agencies—the greater portion of them in the city of Philadelphia, and some in suburban areas in localities where there are no offices or direct payment agencies. The customers in suburban territory use the contractor's agencies only to a limited extent, mainly because of the branch offices or free agencies in a number of localities and the more widespread use of mail as a means of remitting.

Originally, the agents were permitted to take only the bill as rendered up to and including the net payment date. After demonstrating their adaptability to the job, they were finally allowed to take the bill after the due date and even to accept a part payment if such payment represented a recognizable portion of the bill, i.e., the current bill in full, or the arrears in full. We did not permit them to accept payment on a shut off notice. Their instructions are to request the customer to go to a company office.

From all that has been said heretofore, one might gain the impression that there are no disadvantages to the plan. When you are dealing with 575 agents, even by "remote control" through the home office of the contractor, there is always the human element to contend with. Occasionally, agents are remiss in turning in the stubs and a few never turn them in. The latter, of course, become the responsibility of the contractor.

There has never been any difficulty in collecting what is due, through claims made by customers who produce a receipt. Late payments by agents could be a source of difficulty because collection activity might be initiated in the meantime. However, the contractors have been most cooperative in stressing this fact to their agents, and in the final analysis if the agent does not adhere to the rules he is discontinued. It is the belief that the small number of such occasions is outweighed by the general all around advantages of the plan.

The advantages of the Group Agency Plan are many. From the experience gained, it can be said without qualification that the plan has:

1. Eliminated all need for additional offices throughout the territory served.
2. Reduced the lines waiting at cashiers' windows.
3. Effected saving in cashier personnel.
4. Avoided expenditure of a vast sum for new buildings and office equipment.

From the Customer's angle, it has:

1. Created a pleasant and convenient way to pay utility bills.
2. Effected a considerable saving in carfare, check fees, and postage.

Mention has already been made of the five cent fee. It is quite pertinent to point out that this was the fee when the system was first initiated in Philadelphia and it is the fee today. How the contractor is able to do this in face of rising costs in their own activities and the belief on the part of agents, no doubt, that they should get more money, is something that is difficult to answer. However, despite no increase in fee or perhaps because of it, the fact that they have been able to build up customer acceptance to the degree that exists today is certainly a remarkable feat.

The Group Agency Plan cannot always be adopted as a complete substitute for free payment agencies although, under some circumstances, it can be done. However, it is particularly adaptable as a supplement to other types of payment facilities because it is presented to the customer as an option which he can exercise or not as he sees fit.

For any utility which believes that its customers are not being given the proper facilities for payment of bills, this plan offers a very desirable possibility.

Leadership

● Since it is accepted that the practice of good leadership is the road to success for any supervisor, a constant reminder of the essentials may help to reach—and to hold—the desired goal:

1—A profound work knowledge.
2—Develop a set of standards.
3—Confidence in one's own ability.
4—Do good planning.
5—Humanity and good judgment in all dealings.
6—Proper acceptance and transmission of orders.
7—Ability to develop cooperation and teamwork.
8—Use sound supervisory tactics.
9—Give credit where credit is due.
10—Follow through.

—Trained Men

Revitalize Your Sales Force

Arnold Michelson

By ARNOLD MICHELSON

Vice-President, Minneapolis-Honeywell Regulator Co., New York, N. Y.

REGARDLESS of how you look at it most of you will concede that in today's magnificent market, enjoying the benefits of the prodigious purchasing power of an era of wonders, something is askew. The problem is squarely before that singularly distinguished member of the human race known as the salesman.

My friend, Dr. Paul Nystrom, Columbia University School of Marketing, appears a little concerned, however, about whether today's salesman is equipped to handle the assignment. He says that today's salesman knows less, does less and wants more for doing it than any of yesterday's salesmen and—what is more distressing—he is getting away with it.

But why?

The salesman is prosperity's orphan child. When business booms, the skill of selling loses its snap, because it is in disuse. The emphasis then is on production. The salesman and the sales manager fatten up on unmown hay. The production manager and advertising director have a field day, while the sales manager tarries long at the Rotary Club luncheon (at least, that's what he tells his wife) meeting old friends and influencing people who are just as bent on influencing him. He has not had to run out a scratch hit in years.

In a lush period like that, all orders are taken from the salesman forcibly—or they drift in like cows at milking time.

Who is at fault? Who is responsible for these orphaned, unguided salesmen? Primarily, the blame lies with top management. Generally, during prosperous times, management concerns itself with all phases of business except the art of salesmanship. That is the one tool that is not being used continuously, so it is tossed into the warehouse to gather cobwebs, dust and rust.

But let sales volume drop a scant percentile, and who gets the first call to arms. Not production—the fondly loved child of the heyday; not advertising, nor public relations, nor personnel management, nor promotion. No, it is the old reliable business producer, the truck horse of selling. And like the horse who has had no feed box to seek, but has enjoyed the luxury of a nosebag, he finds it difficult to restore new life to his spavined and listless legs.

But now the merchandising musket must be dusted off and the saber of selling shined, because we know that now—not tomorrow morn—selling men must be off to battle. It matters not if they are not in peak condition. They are regarded as minute men who must encounter a worthy opponent—the host of buyers who have become sharp and sinewy and crafty during their lean years—while the sales army was becoming sleek and smug. Yes, this is the kind of opponent we face, if we are to carry off the prize of victory—the bright and shining dollar.

Dynamic Sales Effort

This is no two-sided conflict; it is a war of one against the many, because each salesman not only must meet and overcome the resistance of the buyer, but he also must compete with a host of other products which are bidding for the same dollar. Aggressive selling is behind every product worth the attention of the buyer—not only the products in your salesman's particular field, but *every commodity* we need for life itself—everything with the possible exception of air, water, and sunshine. This happens to be the woof and warp of our system of economics and only by the constant application of dynamic sales effort are we able to avoid the valleys known as depressions.

The fine art (forgotten or remembered) of selling is simple. It is its application that is intricate.

Salesmen are both born and made. William Angus Mathieson says in his modern book for salesmen that we are all born salesmen—and the first sales talk is the baby's wail from its crib. "Matty," as his myriad of friends and admirers know him, says this baby's cry has all the elements of attracting attention, disposing of objections, and closing and—last, I might add—of reaping the benefits.

Management's Part

So what is today's business doing to make better salesmen of its men (and women) who are born to this choice occupation? No one can question the wisdom of business in spending its dollars by socksfull for enlargement of plants, improvement of equipment and research. But has it always been as far-sighted in its attention to sales training and its "cohorted" pals, advertising and promotion?

Regretfully, it appears that in many cases imagination was exhausted before business management began to consider the sales future.

Have the sales-conscious executives all gone over the hill? It is said on good authority that our American over-all sales army needs 550,000 recruits. How many *real* executives man the recruiting cubicles? I know there are salesminded companies which will employ a good-looking, likely candidate on suspicion, hold him incommunicado long enough to keep him from enlisting elsewhere and then clamp an indictment on him, convict him for life with no parole or reprieve from their services—and then fail to keep him from im-

Presented at A. G. A. Sales Conference on Industrial & Commercial Gas in Windsor, Ontario, April 7-9, 1948.

proving in leadership. Add to this the untrained status of an equal number and you see how our era of prosperity has been so prolific in its production of orphans.

Although I have described a virulent, malignant and loathsome disease, it is in no manner an epidemic. We do have managements today which are alert to the necessity of matching plant, equipment and research, with salesmen who are properly recruited and properly trained to cover the market.

Now, let us consider what sales management should do to dispel the lethargic condition that prevails generally. First, it must possess in a large, healthy measure the will to sell. It must be conscious of the fact that sales efforts alone can harvest the benefits of the vast sums expended on research, plant expansion, and general improvement of products. Then it must give salesmen the benefit of modern methods—supported by strong promotional activities so they do not wander in a sea of abstractions.

Salesmen must be trained for their specific assignments. No longer can we apply that old American maxim: that one whereby in time of peace an American felt safe because he firmly believed, "Give me a gun and I can lick any guy that lives."

We cannot give our sales suspect 24 hours of patter and let him out on the unsuspecting world, expecting him to sell anything. No one can sell anything until he knows it intimately, knows what makes it tick and why it is superior, why it will perform satisfactorily, and feels sincerely that it is the one item which the prospective buyer needs to make his world complete.

We all have heard a cry for the return to old-fashioned selling. What we actually need is a renaissance, a movement for new-fashioned selling—selling which carries force persuasion and conviction. You can't sell gas today with yesterday's arguments any more than you can convince your wife that it would be just dandy for her to bring her prewar wardrobe out of the moth balls and surprise her friends by using it as this spring's outfit.

We need a recasting of sales methods in the light of today's requirements. The hues, tones and intensity of the market are different, and what sold gas yesterday may be selling oil or electricity today. What was regarded brightly on Friday as a good prospect, in the cold grey dawn of this Monday may be seen as two prospects —or it may be none at all.

Modern selling is not the hi-jinx of a Diamond Jim Brady or a P. T. Barnum. Personality is important, but it needs concrete support. Modern selling is a coordination of advertising, sales promotion, public relations, publicity, aptitude testing, market research, organized training, graphic demonstrations, materials and refresher courses—and behind all of this we need enough management knowhow to keep these components properly organized and to make certain that newly-acquired recruits to the sales staff are kept vitally alert and, when necessary, that they are *revitalized.*

I believe that the greatest thing which has come out of our late lamented sales-happy period is the fact that many businesses suddenly discovered that their horizons had been broadened. They learned that opportunities existed in new fields which had never even been considered, much less explored.

For example, one company discovered that while it had a substantial business in

Foundrymen Shown Advantages of Gas

A.G.A. reception center and display setting forth advantages of gas for various uses in foundries

SOME 270 exhibitors displayed equipment valued at more than six million dollars, much of it gas-fired, during the fifty-second annual convention and exposition of the American Foundrymen's Association in Convention Hall, Philadelphia, May 3-7. This largest show of foundry equipment since 1930 was attended by nearly 18,000 registered visitors.

A reception center with an attractive display setting forth the advantages of gas for various uses in foundries was sponsored by the American Gas Association. The A. G. A. exhibit was flanked by a large gas-fired core oven display of Young Brothers Co., Detroit, on one side, and on the other the Fisher Furnace Division, Lindburg Engineering Co., Chicago, Ill., with a large gas-fired tilting crucible furnace and a gas-fired forced convection heat treating furnace for aluminum and other products.

For melting, core baking, and mold drying, gas equipment was predominant. Despatch Oven Company showed a draw type core oven; The Foundry Equipment Co., Cleveland, O., had a large Coleman continuous tower core and mold oven, and a car type oven. Both The Campbell Hausfeld Co., Harrison, O., and the Stroman Furnace & Engineering Co., Franklin Park, Ill., had crucible furnaces in their exhibit areas. Wilson Industries Inc., Cambridge, Mass., displayed a 400 pound Sklenar reverberatory furnace.

Literature of all the companies showing gas-fired foundry equipment was available at the A. G. A. exhibit. Representatives of The Philadelphia Gas Works Co., the industrial gas department, Philadelphia Electric Co., and A. G. A. staff members, attended the Association booth to answer inquiries.

Gas-fired core oven (left) and tilting crucible furnace (right) which flanked the A.G.A. display

manufacturing automatic controls for heating plants, it had overlooked enormous potentialities in other fields. It learned through creative selling that its controls were equally effective in regulating temperature of greenhouses so that flowers could be brought to bloom at any predetermined date, thus assuring growers of hitting important markets. It learned that automatic controls could perform many tasks on the farm—everything from turning eggs in incubators to helping to cure cigarette tobacco. It learned that new opportunities existed in the textile, oil, food, and paper fields. Simply by looking around it found that the whole world was automatic-control minded. The world was just waiting to be shown.

By the same token, industry is using gas in countless new applications where it never was used before. The opportunities exist. It's just up to alert sales executives to find the spoor and put salesmen on the job of tracking down the quarry.

Did you ever consider what a prodigious new market was discovered by the chap who decided that the public might like tomato juice even more than it liked whole-canned tomatoes? Yes, they still can whole tomatoes. But I'll bet your family uses ten cans of juice to every one of stewed tomatoes.

Have we clung too long to our old sales ways? Do we still think in terms of the drummer of the Gay 90s and the Gayer 1920s when we have the Fatuous Forties to reckon with—and the Fabulous Fifties, I hope, to get ready to tackle.

Are we integrating product advertising and promotion and seeing them as the tripod on which to mount our sales artillery? If so, we shall land on the target. But I believe that we should remember that first things come first, and, following the old Russian recipe for rabbit stew, first catch the rabbit.

So first, be sales-conscious; then sales-minded and, finally, sales-bodied, stout-bodied—able to pick a prospect off 600 or 6,000 dollars away.

Need more words be used to write the prescription for revitalizing the sales force than to believe in its members, to believe with them, to keep this belief in product and management alive and to focus it on the achievement of doing? So believe in your contribution to your company and your ability to do a better job by applying your own talents—and then do that better job by honest application and full recognition of your need for salesmen and sales management promotion.

And let me add this: spend adequately to do it. You can't get good sales talent cheaply any more than you can get good engineers, chemists, electricians, doctors or nurses cheaply.

If your product is better—and gas in this fuel field is acknowledged to possess fewer faults than any other fuel—then make your sales force, your sales philosophy just as good. You must have it under constant control—automatic control.

A salesman is the inseparable nuclear fission of this whole scheme of things.

The emphasis is different in other fields. A surgeon may make a mistake in an operation and one of his patients may die; he may make other errors and his reputation may suffer, but he can continue in practice with some degree of success. A dentist may pull the wrong molar and perform slipshod work which draws criticism of his patients, but he can go along without suffering too much. A chemist might not come up with the earth-shaking formula and may have to turn his attention to mixing hair tonic, but he manages to get by. And a lawyer may lose case after case, but he always seems to pick up enough business to keep his shingle up.

But a salesman's calling is the most exacting of all. It endures only one kind of performance—perfection. Or, perhaps I should say, it tolerates in the sales category only one kind: good selling.

Gas Companies To Sponsor Food Clinics

GEORGE L. WENZEL, well-known food consultant, will conduct his Food Cost Clinic for a group of gas companies in the northeast this fall. The clinics will be sponsored by the gas companies and will be attended by hotel and restaurant owners and managers, club managers, chefs, stewards, dietitians and others associated with volume cooking.

One of the country's outstanding food authorities and a prolific writer on mass feeding subjects, Mr. Wenzel has spent the past two years conducting short courses in restaurant operation for various restaurant associations.

Gas companies are sponsoring Mr. Wenzel's clinic with a view to establishing closer relations with their commercial customers and proving that their gas company is making a sincere effort to help them in the better conduct of their business. Arrangements have been made to discuss on the program ways in which the proper use of modern gas equipment can reduce operation costs and increase profits.

Principal subjects will be: (1) Quality of foods.—Will include grades of meat, eggs, and canned goods as well as a discussion on quality of other food stuffs, how to buy by specifications, yields of meat, and other food products; (2) Food cost control—Mr. Wenzel will bring out five simple and easy steps of food cost control which will make it possible for volume cooking operators to maintain a predetermined food cost. He will emphasize the importance of portion control, how to affect an efficient portion control system, how to reduce meat shrinkage and fuel saving practices such as grouping pots on range tops, loading roasting and baking ovens to capacity, turning off portions of the cooking equipment when they are not needed, proper use of thermostats and meat thermometers and sundry other topics connected with the best uses of cooking equipment; (3) Payroll control—instruction on how to maintain a specific payroll cost by using the proper modern gas equipment, how this cost can be reduced by the application of time and motion studies, and how to train employees for maximum efficiency.

Mr. Wenzel has spent most of his life in the restaurant business as a manager and owner. He has been a monthly contributor for the past ten years to the *American Restaurant* Magazine and prior to that wrote for other trade papers serving the volume cooking industry.

He is the author of "Wenzel's Menu Maker," a publication prepared as an aid to restaurant operators, and a book entitled "Wenzel's Short Course In Restaurant Operation" which is an elaboration on the material he gives in his clinics. When not engaged in conducting clinics he works as a food consultant and has served in this capacity for large chain organizations as well as for independent operators. In addition, he publishes a syndicated column "Food Service Industry Trends" which appears in the publications of restaurant associations.

Mr. Wenzel hard at work directing a food clinic

The Food Cost Clinic will be given in one of two forms. The first covers the high spots and is given in three sessions, one each day, either in the afternoon or evening depending on the preference of

(Continued on page 50)

New Ways To Increase Base Load

By R. J. MILLER

Appliance Sales Manager, The Ohio Fuel Gas Co., Columbus, Ohio

R. J. Miller

RECENTLY the American Gas Association issued a news release covering an announcement made in Chicago by J. J. Nance, president, Hotpoint, Inc., increasing its promotional budget for 1948 from 2,500,000 to 5 million dollars. Of the larger electric manufacturers, just one is spending six times more money for promotion in 1948 than the entire residential promotional budget of A. G. A.

Mr. Nance indicated the bulk of this huge budget would be devoted to electric range, water heater, dishwasher and disposal unit promotion. The first two appliances, the range and water heater, have long been considered by the gas industry as our primary base load.

I want to call attention to the fourth promotional item of Hotpoint, the disposal unit—yes, the name is registered in the U. S. Patent Office. It disposes of garbage and table leftovers—a minor nuisance around the average home, but not the over-all disposal problem—the bushels of waste paper, food wrappings, confidential correspondence, cancelled checks, medical materials and a hundred other combustible items which cannot be burned in the millions of furnaces now equipped with gas, oil and stokers in this country.

The disposal unit is not the answer to the over-all need of garbage and refuse in the automatically heated home. Gas alone is the answer to this problem. Gas as the fuel is an adequately sized incinerator. Many of us had experiences in the late 20's with incinerators on which the drums and grates burned out, timing mechanisms failed to function, garbage was left unburned and sales were nearly impossible to make.

However, conditions of need were different in those days. Only a fraction of the number of automatic heating jobs were in use as is the case today. Food was not wrapped in paper containers and bags. Frozen food packages were nearly unheard of. Laundry and dry cleaning cardboard and wrappings were not used. All in all, the refuse problem then was only a fraction of today's and the hand-fired coal furnace was a ready place to burn it.

We can get the jump on our electric competitors aggressively going after this new base load usage of gas. I say the incinerator is base load usage for gas because it is used 12 months of the year. Its summer usage exceeds the winter because of the greater volume and moisture content of fresh fruit and vegetable leavings during the summer season with generally a lesser volume of combustible materials assisting incineration than in the winter.

Customer Satisfaction

In the last 13 months, our company has installed some 2,100 incinerators. Less than five of our 110 salesmen had ever sold an incinerator before January 1947. In considering the addition of an incinerator to our line of equipment, a survey was made of a representative number of gas heating customers which indicated a definite need existed for refuse disposal with garbage disposal thrown in as an extra. Many customers admitted they had considered an electric disposal but would much prefer an incinerator which would solve both problems. Most customers set a limit on an expenditure of less than $100 for an incinerator.

Here is an unsolicited testimonial from an early purchaser of an incinerator:

"Dear Betty Newton: Have never written you before, but when I heard you mention the Green Cab driver who has had a Servel for ten years without a service call, I couldn't help but write you. We made a very fortunate purchase of a Servel in 1933, 15 years ago. Like the Green Cab driver, we, too, have never had a service call. We've heard many such stories about Servel—but your company installed an Incinor for us over a year ago and, frankly, I don't know which of the two, my Servel or Incinor I would give up if I were allowed to keep only one. This winter has been so severe—I just don't know how I could have disposed of all the rubbish from a family of four without this modern appliance. Why don't you tell more of your listeners about it?" (Signed) Mrs. Groves, Plain City, Ohio.

This is just one of many unsolicited letters we have received which indicate customer satisfaction.

As to makes, two general types are on the market. One utilizes the principal of dehydrating the garbage and refuse with a small constantly burning pilot. When the contents are dried out, they ignite, liberating very little if any outside odors. Limited capacity and slow operation are the difficulties experienced with this general type. The second type is intermittently fired two to three a week as the two to three bushel drum becomes completely filled. A 12,000 to 18,000 B.t.u. burner is lighted and burned from 30 to 60 minutes, depending upon the moisture content of the load, thereby providing rapid incineration. This type incinerator does not eliminate outside odors on humid, sultry days, but its capacity is so sufficient that users can delay burning until more favorable draft conditions prevail. Little or no difficulty prevails on either of the two general types as to basement odors.

Presented at A. G. A. Eastern Natural Gas Regional Sales Conference in Pittsburgh, Pa., March 10, 1948.

In 1945, Penn State College completed their research on an incinerator which completely burned garbage and combustible refuse without making any odor. A demonstration was recently given in Pittsburgh before 90 people and none were able to detect the odor of burning garbage, though a flue was not used on the unit.

As I understand it, this new development uses two burners, one for the burning of the refuse and garbage and the second for consuming the smoke and odor. Currently, several incinerator manufacturers are investigating production possibilities of this experimental model. More will possibly be heard commercially about this Penn State College development.

Incinerators, from our experience of the past year, have an exceptionally good load factor with a consumption between 3,000 and 12,000 cubic feet of 1,050 B.t.u. gas per year depending upon the type.

Another appliance of the base load class is the automatic gas clothes dryer—also rather a newcomer on the market. You may remember the old type dryer of years ago, but please don't confuse it with the automatic gas clothes dryer of today. Although we have a definite operating cost and installation cost advantage over electric competition, continuance of many gas utilities to ignore this new use of gas under the pressure of current gas shortage problems will definitely give competitors a running start for this business. Don't for a minute forget that an electric clothes dryer gets one foot in the door on 220 volts and makes it easier for the other foot to bring in an electric range.

Users of automatic clothes dryers insist that the clothes dryer is in the same relative position as the washing machine was in 1920. The potential for clothes dryers is nearly as great as the number of homes having washing machines. With laundry being simplified by the new type washers, laundry day being designated by good drying weather, and the tendency with the automatic washer toward smaller and more frequent washings, the dryer is a natural in labor and time saving in the home.

We are living in an automatic age. Picture if you will a 1948 homemaker rubbing her entire laundry on a scrubboard. Yet most homemakers trudge the heavy basket of wet clothes up the steps, stretch a clothes line, stoop over hundreds of times hanging up the clothes, frequently have a storm come up and hurriedly remove them, only to repeat the process again later in the day or trudge them back to the basement and dry them indoors, all the time subjecting the laundry to soot, smudge, germs and the influence of children and dogs. Our customers just don't know the advantages in health and convenience of an automatic gas clothes dryer.

Frequently, I have heard gas men overemphasize the moisture problem of the automatic dryer. True, this is a problem which must be recognized, but once we realize that natural circulation from a window or use of a window ventilating fan overcomes this problem, then the moisture problem disappears. Others say—you can't dry wollens, certain rayons and nylons in a dryer which limits their usage. But can you wash such items in a washing machine? Generally speaking, anything you can wash in a washing machine you can dry in a dryer. And many users, give the homemaker a lot of credit for ingenuity, dry all sorts of things in the dryer, including woolens and finer rayons. They've experimented and found a way.

Another splendid advantage of the dryer being found in many homes is elimination of ironing for many items such as bed sheets, underwear, children's play clothes, certain types of breakfast tablecloths, and the like. This is a real labor saving to the homemaker, particularly in 1948 when laundry help is so expensive and difficult to get.

Our experience with automatic clothes dryers indicates this type of business has a very good load factor in that like the incinerator, summer usage exceeds winter. This is due to a greater volume of washable clothing being worn in summer than in winter. Consumption averages around 15 cubic feet of 1,050 B.t.u. gas per hour with approximately five to six hours usage per week, or an annual consumption of 5,000 cubic feet of 1,050 B.t.u. gas.

Remember that every additional use of gas you place in your customer's home makes it more difficult for your competitors to get in. A good offensive is the best defensive—an incinerator and an automatic clothes dryer in customers' homes means a strong offensive.

A. G. A.
New York-New Jersey
Sales Conference
in Rye, N. Y.
May 24-25
Will be Reported in the
July-August MONTHLY

Teachers Guests at Pittsburgh Dinner

"Blue Flame" Misses, with novel hats representing flames with (l. to r.) Kathryn L. Barnes, Equitable Gas Co., arrangements chairman; Flora G. Dowler, The Manufacturers Light & Heat Co.; E. Carl Sorby, George D. Roper Corp., and Ruth M. Severson, The Peoples Natural Gas Company

MORE than 200 home economics teachers and principals from Allegheny County schools were guests at a dinner in the William Penn Hotel, Pittsburgh, Pa., held on April 27 by Equitable Gas Co., The Manufacturers Light & Heat Co., and The Peoples Natural Gas Company.

Advantages of the modern automatic gas range in progressive homemaking departments were outlined by E. Carl Sorby, vice-president, George D. Roper Corp., Rockford, Ill., in a talk entitled "Cooking Unlimited." Highlighting his talk was an exhibit of several manufacturers' latest model automatic gas ranges as well as a photographic display of recent school installations. Gas laundry dryers, gas refrigerators, and automatic gas water heaters were shown on the stage.

Acting as toast master, Raymond Little, general sales manager, Equitable Gas Co., introduced Irene McDermott, supervisor of home economics in the Allegheny County schools, who delivered a brief address.

Kathryn Barnes, home service director, Equitable Gas Co., served as chairman of arrangements for this annual dinner.

Weirs and the Gas Calorimeter

By JOHN H. EISEMAN and RUTH F. PLAPP

National Bureau of Standards, U. S. Department of Commerce, Washington, D. C.

IF the highest accuracy is to be obtained with the Cutler-Hammer Recording Gas Calorimeter, there is one point in its maintenance which we believe should receive more attention. The instruction manual of this instrument states that one cause for a low reading is oil on the water in the main tank, which may prevent water from overflowing the weir evenly and thus produce a high water level.

Unquestionably, oil or other foreign material, such as dirt or a film of oxide, which may form on the edge of the weir will produce this effect and may cause an appreciable error without detection by the operator. Such a condition was found recently in connection with experimental work conducted in the gas utilization laboratory at the National Bureau of Standards. The calorimeter[1] had just been given a complete maintenance job, including adjustment of the air-gas ratio and a hydrogen test, which indicated that it was operating satisfactorily. A natural gas having a heating value of 996 ±5 B.t.u. was then connected to the calorimeter which indicated a heating value of 996 B.t.u. The instrument was then shifted to the city gas supply (a natural gas of approximately 1,100 B.t.u.) and allowed to run overnight.

The following morning the known gas was again connected to the calorimeter, which this time indicated four B.t.u. less than on the previous day. After checking several points, such as the cold and mechanical balances of the recorder and finding them correct, it was decided to clean the weir with carbon tetrachloride, although it appeared to be clean and wetting uniformly with water. This resulted in bringing the reading of the calorimeter back to its previous value (996 B.t.u.).

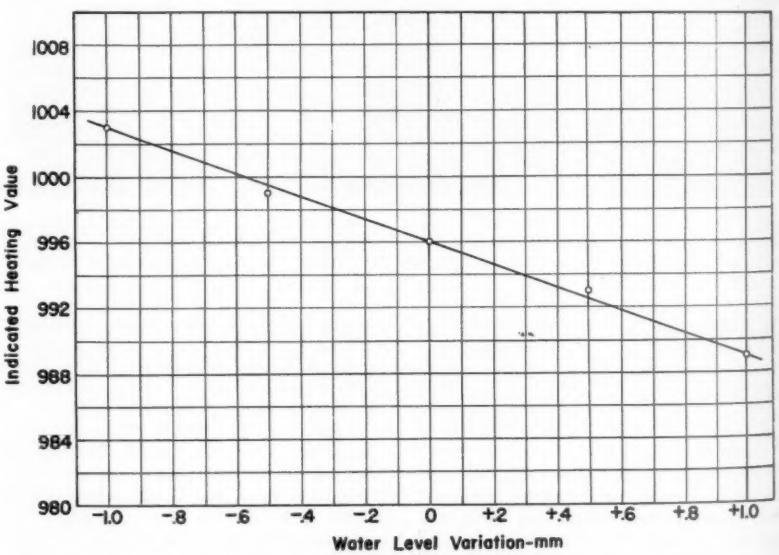
It was found that a thin film of wetting agent applied to the weir caused the known gas to be recorded four B.t.u. too high, which indicated that the water in the main tank had lowered from the level at which the original recording (996 B.t.u.) had been obtained. A thin film of vaseline applied to the clean weir resulted in a reading which was 12 B.t.u. below that obtained when the wetting agent was applied to the weir. When the vaseline was removed the original reading was again obtained. In none of these tests was the change in water level sufficient to be readily noticed in an examination of the weir.

In view of these results it was decided to construct a weir which could be lowered or elevated by known amounts in order to determine the actual water level change for variations of the order of magnitude found above. A weir[2] was constructed with a vernier capable of adjustment in increments of 0.01 m.m. and

[1] The instrument used in these tests was designated as a type AB calorimeter and was purchased new in December 1940. The weir supplied with the calorimeter was of the type which was standard equipment at that time. We understand that a different type of weir is now being supplied with new calorimeters which can be installed in older calorimeters if desired. It is claimed by the manufacturer that with the new type of weir there is less variation in water level in service than with the older type. We have had no experience with the new weir, and all data in this paper were obtained on the older type. It is believed that a large number of calorimeters now in service are still equipped with the older weir.

Presented at luncheon meeting during A. G. A. Production and Chemical Conference in Asbury Park, N. J., May 24-26, 1948.

[2] This weir was designed and constructed by H. W. Bailey of the Bureau's Instrument Shop.



Effect of water level change on heating value shown by recording gas calorimeter (996 B.t.u. gas)

with a full variation of 1.00 m.m. in each direction. The weir proper was made of stainless steel to minimize the effect of corrosion and was given a mirror finish so that any deposit would be more readily observed. This weir was installed so that when it was in the center of its range of adjustment it had the same height as the original weir.

Ratio Test Made

An air-gas ratio test was then made and the gas meter adjusted so that the ratio was correct when the weir was in this position. The gas of known heating value was again connected and the calorimeter again read 996 B.t.u. From this initial position the height of the weir was varied by known amounts in each direction and allowed to stay at each setting until a constant reading was obtained on the "standard" gas. The results obtained from this series of measurements, shown in the accompanying figure, indicate that to lower the water level by 1.00 m.m. raises the heating value reading seven B.t.u., and to elevate the water level by 1.00 m.m. lowers the heating value indicated by an equal amount for a gas of 996 B.t.u.

This is a change of 0.7 percent for a water level variation of 1.00 m.m. The same percentage of change would be expected for a gas of any other heating value. The precision indicated by the data shown in the figure may be somewhat misleading, since the tests were made under conditions such that most variables which might affect the reading of the calorimeter remained approximately constant, and only the water level was changed. Previous experience with the calorimeter suggests that over considerable periods of time errors of several tenths of a percent in its indications might be expected, even if the water level remained constant.

Dirt Accumulates

These preliminary studies show that in service errors of at least 0.4 percent may result from a slight accumulation of foreign material on the weir. Our experience also indicates that the weir may not remain clean for any definite period of time—it may remain in good condition for weeks or it may become dirty overnight. It is therefore recommended that a thorough cleaning of the weir with a volatile solvent, such as carbon tetrachloride, be added to the items of weekly care suggested by the manufacturer of the instrument.

Purging Committee Work Discussed

Purging Committee: (l. to r.) A. Gordon King, secretary; Jesse S. Yeaw, Rochester Gas & Electric Corp.; H. E. Ferguson, The Peoples Gas Light & Coke Co.; Edith Grace, A.G.A.; G. R. King, Philadelphia Electric Co., chairman; H. S. Carpenter, Public Service Electric & Gas Co., Newark, N. J.; W. E. Russell, Consolidated Gas, Electric Light & Power Co. of Baltimore; J. W. Penney, Boston Consolidated Gas Co.

UNDER the energetic leadership of its chairman, G. R. King, Philadelphia Electric Co., Philadelphia, Pa., the Purging Committee of the Technical Section, American Gas Association, is continuing work initiated last year consisting largely in amplifying existing recommended procedures which have been applied successfully throughout the gas industry since.

A three-day committee session was held in New York recently to provide time for detailed studies and discussion of the technical text and recommended procedures. Various subjects have been assigned to different members for coordination and further discussion at the June meeting.

INDUSTRIAL RELATIONS

(Continued from page 23)

will be responsible for seeing that all nine elements are present in the jobs of persons they supervise, and it is up to them also to make certain that rank and file workers know that the factors are present.

● **A union's right to bargain** on pension and retirement plans has been upheld by the N.L.R.B. in the Inland Steel Company case. It is understood that there will be an appeal by the company. Also in connection with retirement of employees, a recent arbitration case in New Jersey involved the compulsory retirement at age 65 of certain employees, subject to a union contract. Since the compulsory retirement age was established unilaterally by the company, the reemployment of the individuals was ordered. The employees involved were not included in an established annuity plan because they were over 50 when hired.

● **The new income tax law,** as affecting workers in industry, will be equivalent to a wage increase in the order of from two to four percent. This may be of interest in any discussion of wages in negotiations.

● **The constitutionality** of the financial and non-communist filing requirements of the Taft-Hartley Act have been upheld by a special federal court in the District of Columbia. It is reported that the case will be carried to the Supreme Court of the United States for final decision.

A. G. A. Production and Chemical Conference in Asbury Park, N. J. May 24-26 Will be reported in the July-August MONTHLY

"Safety Comes First"

A VERY readable and attractive booklet entitled "Safety Comes First," has been published by Consolidated Edison Co. of New York, Inc.

Liberally illustrated with photographs and charts, the publication shows that the company's accident frequency rate is "well below the national average for the electric and gas industry, both of which set outstanding records." Statistics for 1946 are used as those were the latest full-year figures available when the booklet went to press.

W. F. Brown, safety director, Consolidated Edison, is currently chairman, Accident Prevention Committee, American Gas Association.

March of Events at A.G.A. Laboratories

TESTING operations at the American Gas Association Testing Laboratories as well as appliance inspection and requirements activities have remained at an exceedingly high level throughout the winter and spring. The trend is a continuation of that which developed last year when an all-time peak was reached.

Wartime extensions of the five-year approval period for equipment originally tested during the period 1940-42 expire at the end of the present calendar year. Since such models, to secure reapproval after that date, must comply with present requirements, it is expected that their resubmission will tend to keep testing operations at an unusually high level throughout the balance of the year.

The Inspection Department has now completed all its regularly scheduled annual inspections of appliances in the field both from the Cleveland and Los Angeles Laboratories. Approximately 400 factory visits for this purpose have been made during the current inspection season.

On the whole inspectors found equipment in the field in satisfactory condition although several instances were encountered where extensive corrections were necessary before approval could be renewed.

The A. G. A. Subcommittee on Requirements for House Piping and Appliance Installation at its recent meeting took steps to revise and expand its present standards. It is planned to broaden them to cover various types of equipment in the light of latest developments. Extensive revision of the present text is now well under way.

Studies have been initiated of operating temperatures of accessories located in central heating appliance control compartments and of heat distribution in hotel and restaurant range ovens. Results from this latter project, it is believed, will be applicable to similar problems encountered in measuring heat distribution in portable bake ovens.

Technical studies of two domestic gas research projects have been completed and tentative reports on the subjects submitted to the respective technical advisory groups. Covered are the operation of central heating furnaces under conditions of varying heat outputs and ignition of range top burners at reduced gas input rates.

A group of home economic students from Iowa State College were recent among visitors to the Laboratories. Their call marked the resumption of annual visits by students from that college which had been interrupted by the war.

Industry Adds New Leadership Award

ANNOUNCEMENT of a new competition entitled the American Gas Association Progress Award in Gas Summer Air Conditioning, provides still more recognition for gas industry leadership under the Association's broadened program of awards which was adopted last year.

Entries for the new **A. G. A. Progress Award in Gas Summer Air Conditioning** are due by August 1, 1948. The award is sponsored by Servel, Inc., Evansville, Ind., and is designed to give recognition to exceptional achievement in the advancement of this important phase of gas industry activities.

All member gas companies are eligible. Requirements are outstanding accomplishments in any phase of gas summer air conditioning during 1947.

The award comprises a progress trophy, $1,000 in cash, and miniature trophies for individuals, all of which will be presented at the 1948 A. G. A. convention in Atlantic City, New Jersey.

Entries for the Association's other major awards should meet the following deadlines and conditions:

● **A. G. A. Distinguished Service Award**—entries due before August 1, 1948.

This is the industry's most coveted honor and is presented annually to the individual who has made the most outstanding contribution toward the advancement of the gas industry.

The award consists of an engraved certificate and a substantial cash payment.

● **Beal Medal.**

The highest technical recognition in the industry, it was originated by the late W. R. Beal and is now sponsored by Ernest R. Acker, president and general manager, Central Hudson Gas & Electric Corp., Poughkeepsie, New York.

The Beal Medal is awarded to the sole author of the best technical paper presented at a meeting of the Association or printed during the Association year beginning and ending October 1.

The award is a bronze medal and financial recognition.

● **A. G. A. Home Service Achievement Award**—entries must be postmarked not later than July 30, 1948.

Presented to directors of home service departments for achievement in the area served by each company and to those individuals whose ideas have contributed most to the advancement of modern homemaking by promoting interest in and better use of gas and modern gas equipment in the home. The award is sponsored by *McCall's* Magazine.

Unique feature of the contest is the recognition of individual ideas as well as contributions of home service departments. Such ideas of achievement may include community or group activities, home call operation, cooperation with the gas company, equipment or sales promotion, kitchen planning, activities with educational or other groups, or any other outstanding home service activity.

Financial awards and bronze plaque will be presented to winners in each of three divisions: companies with more than three persons in the home service department, companies with at least one but not more than three home service representatives, and to individual members of home service departments of three different companies whose ideas have contributed most to the advancement of modern homemaking through the use of gas equipment.

● **A. G. A. Gas Heating Progress Award**—entries must be postmarked not later than June 30, 1948.

This competition has been specifically designed by The Coroaire Heater Corp., Cleveland, O., to give public recognition to individuals who have done most to create, maintain and increase consumer demand for gas heating. The award was first introduced in 1947 and consists of substantial financial payments.

● **Meritorious Service Award**—entries due on or before August 1, 1948 on a form provided by the Association.

This award for heroic action continues to be the industry's highest recognition for the saving of life and property. It consists of a gold medal and button plus a certificate, and is presented to the individual who has performed the most meritorious act in the gas industry each year beginning July 1 and ending June 30.

The winner must have shown conspicuous judgment, intelligence or bravery in saving human life either in the plant or works of any gas undertaking or connected with the handling of materials of manufacture or of the products manufactured or distributed.

The award was made possible through the generosity of the late Walter R. Addicks, senior vice-president, former Consolidated Gas Co. of New York.

Cooking School Popular in Reading

THE problem of bringing the prospect to the merchandise was solved recently in a two-day all-gas cooking school promotion by Kaufman's, Reading, Pa., furniture and appliance store.

Cooperating with Consumers Gas Co., Reading, whose home economist, Mildred Abrams, conducted the demonstration, the store promotion drew more than a thousand visitors. Local newspaper and radio advertising were used to build a capacity advance registration.

Peoples Natural Gas Explains Emergency

WHAT PEOPLES GAS IS DOING
IN THE NATIONAL FUEL EMERGENCY—
a $19,900,000 PROGRAM
For several years there has been a nationwide crisis in all fuels. This is in no way due to decline in our natural resources. It is a direct and unavoidable result of the war.
During war years, it was impossible for the fuel industries to expand production and transportation equipment in step with increasing demands.
Today, demands are still increasing, while production and transportation equipment fight an uphill battle in the face of critical shortages of material. This is why restrictions on gas heating installations and cold-weather curtailments of gas to industry have been necessary. But definite progress is being made.
A PROGRESS REPORT TO OUR CUSTOMERS
To improve the supply of natural gas to Peoples' customers, we spent $5,500,000 in 1947 and have set aside $14,400,000 for 1948 and 1949. Here, briefly, is an explanation of the conditions we face and what we are doing about them.
146 MILLION CU. FT.
DEMAND ON COLDEST DAY
67 MILLION CU. FT.
WINTER OF 1945-46
47-48
WE'RE SUPPLYING MORE GAS in an effort to meet increased demand. In 1939 we supplied over 19 billion cubic feet to all customers—domestic, commercial and industrial. In 1946, this figure jumped to over 39 billion cubic feet. In 1947, we supplied over 43½ billion cubic feet. This increase in deliveries is evidence that we have made noteworthy progress. However, as shown in the next chart, the increase in demand has been phenomenal.
GAS DEMAND INCREASED. Gas demand by domestic and commercial users only (not including industrial) on the coldest day of winter 1945-46 was 67,326,000 cubic feet. It would have taken 146,000,000 cubic feet to meet in full the demands of domestic and commercial users under the same weather conditions this past winter. This is an increase of 118% in only two years . . . an increase impossible to anticipate.
GAS FROM THE SOUTHWEST is being piped to you in increasing volume. The Consolidated Natural Gas Company, of which we are a part, is receiving from the Southwest 265 million cubic feet daily. Expansion is planned by our suppliers to increase this to 450 million cubic feet daily by next winter. Achievement of this expansion is dependent upon deliveries of pipe and equipment to the transmission companies serving us.
WE ARE EXPANDING our own local facilities. As fast as material becomes available, we are expanding our own distribution lines to handle the increased volume promised from the Southwest. For this purpose, 1,127,700 feet of pipe are required. We are improving our underground storage capacity, too. We are drilling 125 new wells in Pennsylvania, many at great financial risk in untested "wildcat" territory, to increase local natural gas production.
THE FUEL PROBLEM IS NATIONAL. Our solution of the local phase of it is already blueprinted. Vast sums of money for necessary expansion are already budgeted. Everyday, work is going forward as fast as the availability of pipe and equipment allow. It will take time—but we'll keep you informed as progress is made.
THE PEOPLES NATURAL GAS COMPANY
Serving Homes and Industries in Western Pennsylvania

Initial advertisement in newspaper campaign of The Peoples Natural Gas Co., Pittsburgh, Pa., designed to tell customers what is being done to meet the gas "shortage." It is pointed out vast sums have been budgeted for expansion and work is proceeding as fast as pipe and equipment supplies permit

Tappan Issues Sales Portfolio for Dealers

A NEW spring portfolio issued by The Tappan Stove Co., Mansfield, O., with the theme "A Cook Takes A Look At Tappan" illustrates for dealers the important part each sales help plays in the promotion of his business. It is one of the most complete and comprehensive programs compiled by a manufacturer.

The portfolio covers sales helps available to dealers to aid them in doing a more thorough and better job of merchandising in the form of radio announcements, newspaper advertisements, outdoor posters, background displays, identification signs, truck decals, and numerous other helps, including the new Tappan Super Salesmaker display.

A. G. A. Forms Group to Study Rate Filing Rules

A COMMITTEE of gas industry executives headed by George S. Young, vice-president, Columbia Engineering Corp., New York, N. Y., as chairman, has been appointed to confer with the Federal Power Commission regarding the F.P.C.'s proposed amendments in Docket R-107 prescribing rules for filing rate shedules.

Other members of the committee are M. A. Abernathy, United Gas Pipe Line Co., Shreveport, La.; G. W. Clark, Cities Service Gas Co., Oklahoma City, Okla.; F. W. Griffith, The Peoples Gas Light & Coke Co., Chicago, Ill., and W. G. Marbury, Mississippi River Fuel Corp., St. Louis, Missouri.

Earlier the F.P.C. had approved the Association's application for a 30-day extension until June 14 for filing comments and suggestions to the proposed amendments.

Consolidation of Niagara Hudson Units Approved

CONSOLIDATION of three major units of Niagara Hudson Power Corporation into a single operating company with plant facilities valued at $450 million, has been approved by the New York State Public Service Commission.

Niagara Hudson will be dissolved when New York Power & Light Corp., Albany, Central New York Power Corp.,, Syracuse, and Buffalo Niagara Electric Corp., Buffalo, are combined into a single company to be known as Buffalo Niagara Electric Corp., Buffalo.

The new company will serve a population of 2,500,000 in 60,000 square miles covering 33 counties and will be the largest utility in the state outside New York City.

Company officials estimated that the consolidation would result in an eventual saving of one million dollars a year in operating costs.

Humble Oil to Build Gas Conservation Plants

HUMBLE OIL AND REFINING CO., an affiliate of Standard Oil Co. (New Jersey), plans to continue its long-range gas conservation program at a cost of $11,837,000. Last year the company spent $5 million for gas conservation.

Construction of plants to extract gasoline from natural gas is planned for Conroe and Picton, Texas, and Opelousa, Louisiana. Gas-injection plants will be erected at Seeligson and Kelsey, Texas. These new plants will process 186 million cubic feet of natural gas daily.

Industry Reports Iron and Steel Needs

GAS companies in the next 18 months require more than three million tons of steel and cast iron to meet demands of present customers and new housing extensions. This amount of steel and iron is needed for maintenance, repairs and operating supplies, and to alleviate present gas shortages. The estimates are not the basis for expansion programs of any kind.

For plant structures and equipment the manufactured, mixed and natural gas companies need 805,900 tons of steel and 211,400 tons of cast iron. Natural gas companies require an additional 2,217,400 tons of steel for gathering and transmission lines.

These estimates were compiled by two committees appointed under Public Law 395 relating to voluntary allocations of steel. One committee appointed by the American Gas Association under the chairmanship of Alexander Macomber, director, Portland Gas Light Co., Boston, surveyed steel requirements of 230 gas utility companies exclusive of natural gas gathering and transmission facilities. A natural gas committee appointed by the National Petroleum Council, and headed by N. C. McGowen, president, United Gas Pipe Line Co., Shreveport, La., interrogated over 100 companies on their requirements for gathering and transmitting natural gas.

Purpose of these committees is to place steel requirements of the gas industry before proper government authorities so the industry will receive every possible consideration in any voluntary allocation of steel. The surveys covered six calendar quarters from April 1, 1948 to September 30, 1949. The industry's requirements as assembled by the two committees will be coordinated by the Gas and Oil Division, Department of the Interior, and presented to the Steel Advisory Council, Department of Commerce.

Ditch-Digging Goliaths Completed

Two 95,000-pound ditch diggers such as the one shown above, have been completed, another is near completion at Houston, Texas, and a fourth is planned. The "monster" is able to ditch through any terrain up to very solid rock and can cut a ditch approximately four feet wide and nine feet deep. Eight similar but smaller machines weighing approximately 75,000 pounds are currently being used

Columbia Gas System Increases Supplies

THE Columbia Gas & Electric Corporation has received the new corporate title, The Columbia Gas System, Inc. The Corporation and its operating subsidiaries, long known unofficially as Columbia Gas System, delivered last year 231 billion cubic feet of gas through 31,000 miles of transmission and distribution lines. The system plans to deliver by 1950 in excess of 300 billion cubic feet of natural gas annually.

One subsidiary company, Equitable Gas Co., Pittsburgh, Pa., reports that additional supplies of natural gas, coupled with increased production by Equitable and its affiliates, will increase the company's underground storage of natural gas from 8.9 billion cubic feet in 1947 to an estimated 12.9 billion cubic feet in 1948 and 23.0 billion cubic feet by 1952.

As a result, Equitable has notified its industrial customers that the 40 percent winter curtailment period will be reduced next winter from five to three months, and perhaps even further, depending upon weather conditions.

The company expects to be able to furnish next winter approximately 10,000 additional homes with natural gas for house heating, including 7,500 within Pittsburgh itself.

A large portion of the added gas supplies will derive from a new contract with Tennessee Gas Transmission Co., Houston, Texas, which will provide 30 million cubic feet of natural gas a day by 1951, and an increase in the contract with Texas Eastern Transmission Corp., Shreveport, La., from 25 million to 30 million cubic feet a day beginning May 1, 1948. A contract with Columbia Carbon Company will eventually bring five million cubic feet of natural gas a day to Equitable's West Virginia lines.

The Columbia Gas System, Inc., through its subsidiary, Home Gas Co., has increased the supply of natural gas for several thousand customers in southern New York with the opening of a $5,500,000 122-mile pipeline from Olean, N. Y., along the southern border of the state to the Hudson River near Nyack.

C. E. Bennett, president, Home Gas Co., pointed out that the additional supply does not create a "cure-all." "Neither does it, by itself," he continued, "assure the elimination of gas curtailments during peak-load periods or the relaxing of restrictions on gas use for house heating."

However it is an important step toward a better, steadier supply of gas. The line initially will supply about 13 million cubic feet of gas a day. Gradually this volume will be increased to a maximum of 45 million feet by 1952.

A. G. A. Issues Load Characteristics Report

A TIMELY and valuable report pertaining to customer load characteristics recently has been issued by the Rate Committee, American Gas Association.

This report is intended to center effective attention on the urgent need within the industry for dependable information on customer load characteristics. It presents a comprehensive description of a suggested method for making such studies, outlines the data which may be developed from such a study and describes the uses to which it may be put. The Rate Committee hopes to secure the cooperation of a least 20 gas utility companies in the collection of sufficient data from which conclusive customer load characteristics may be developed.

Headed by Frederick C. Beck, rate department, United Gas Pipe Line Co., Shreveport, La., the committee received valuable assistance in the preparation of the report from the Technical Section's Subcommittee on Distribution Design and Development, Calvin A. Brown, Rochester Gas & Electric Corp., Rochester, N. Y., chairman. The report also has the endorsement of the A. G. A. Committee on Economics, Robert E. Ginna, Rochester Gas & Electric Corp., chairman.

Development of the report was completed

by a subcommittee comprised of Robb Quinby, The Brooklyn Union Gas Co., chairman; I. L. Craig, Philadelphia Electric Co.; C. F. deMey, Columbia Engineering Corp., Columbus, O.; George A. Morgan, The Peoples Gas Light & Coke Co., Chicago, Ill., and F. M. Terry, Consolidated Edison Company of New York, Inc.

Commenting on the report in the foreword, Chairman Beck said: "This report is significant to every company in the Industry, whether it be manufactured, natural or mixed. In the light of recent developments in the industry, it hardly seems necessary to expound on the uses of customer load characteristics data. The rapidly increasing demands by customers emphasize the value of the demand and diversity data in engineering design.

"The sharply changing cost picture places a premium on a knowledge of cost behavior. The latter, in turn, is vitally affected by the characteristics of customer usage, but, until accurate data are collected, any study of the economics of our business leaves much to speculation. The contribution to net income of the various segments of the business cannot be determined with confidence without a knowledge of the characteristics of customer use."

California Sees "Symphony of Foods"

A "NEW Symphony of Foods" was presented to Southern California March 9-11, when more than 12,000 homemakers flocked to three theaters to witness the first postwar cooking school sponsored by the *Santa Ana Register* and Southern Counties Gas Company at Santa Ana, California.

Anna Bines, home economist for the National Live Stock and Meat Board of Chicago, who is nationally famous for home demonstrations, was on the stage as instructor during the three-day event.

Among prizes given away were a gas furnace, a new automatic gas range, and a 1948 gas refrigerator. A battery of gas ranges was used back-stage to prepare the food demonstrated during the show.

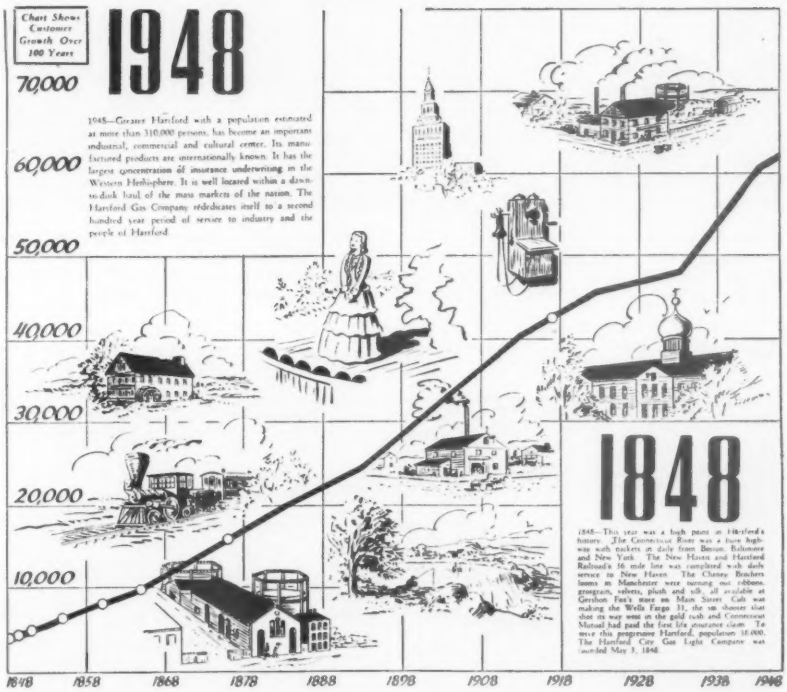
Gas company people who helped with the arrangements and assisted at the show were Walter Geldert, sales supervisor, Charles Fischle, special representative, Louise Thomas, home service director, and Mary Nelson, secretary.

All the leading merchants of Santa Ana cooperated in the show by offering prizes. The demonstrations were performed before a model New Freedom Gas Kitchen set erected on the stages in the theaters.

Newspaper Honors Cincinnati Company Dividend Record

SECOND place on the *Herald Tribune's* recent list of companies who common stocks have paid dividends for 41 years or longer was occupied by Cincinnati Gas & Electric Co., Cincinnati, O., with a record of 95 consecutive years of dividend payments.

The Hartford Gas Company Celebrates *One Hundred Years* of Continuous Public Service



Through flood and fire, through wars . . . panics . . . depressions and other adversities, Hartford's oldest public utility company has furnished continuous gas service for nearly one hundred years

SHOWN above is cover of special eight-page section in local newspaper depicting progress of Hartford Gas Company, during 100 years' growth.

N. B. Bertolette, president, at an anniversary dinner on May 3, stated that the company started with five miles of gas mains and today has 475 miles. Hartford Gas is particularly proud, he said, of its 98 years of uninterrupted dividend payments.

In 1928, the company established one of the first home service departments in New England and today has a competent staff trained to give a wide variety of services.

Arra Sutton Mixter, home service director, Hartford Gas Co., with assistants in cooking demonstration in company's modern auditorium. (Inset), Mrs. Mixter and staff giving demonstration 20 years ago

New Yorkers See New Freedom Gas Kitchen

Eloise Davison, Home Institute director, New York "Herald Tribune," featured the New Freedom Gas Kitchen shown above at the National Home Show in Grand Central Palace, New York, April 17-24. Martha Carnes, Servel, Inc., Catharine Haigler, The Brooklyn Union Gas Co., and Mrs. Dione Lucas (at the microphone) of the Cordon Bleu Restaurant and Cooking School, were guest demonstrators

West Hartford Show Features Gas Appliances

Hartford Gas Company exhibit at Home Show Exhibit in West Hartford, Conn., State Armory attracted 25,000 visitors and had as chief attraction a six-room model home completely furnished and equipped with a modern automatic gas range, a gas refrigerator and a gas water heater

Gas-Oil Domestic Heating Unit Devised

AUTOMATIC domestic heating equipment, which utilizes natural gas during mild weather and switches to fuel oil in severely cold weather, has been perfected by the Midwest Research Institute, on a research project sponsored by The Gas Service Co., of Kansas City, Missouri. The newly developed equipment will utilize gas and fuel oil efficiently, either separately or in combination in the same unit.

About two years ago the Institute was handed a problem encountered by gas distributing systems in supplying gas for home heating use during periods of severe weather conditions. With few exceptions there has been no general use of individual standby equipment because of mechanical difficulties and extensive changes required in the combustion unit.

The complexity of the problem required extensive development work before models were perfected and put into use during the past season. Twenty-five units were installed in private homes and, with only minor adjustments, the performance of all units was excellent. Based upon the tests obtained with the original installations, 10 to 25 percent oil in the total fuel requirements will relieve both peak-load gas "shortages" during cold waves and the peak delivery problems imposed on oil companies and their distributors.

The Institute's engineers report the efficiency of the new gas-oil unit has been carefully tested and found to be equal to that of existing oil and gas units manufactured separately. Gas is burned in a conventional manner, but a new and different oil burner has been developed which is built into and around the gas system so that many parts are interchangeable. The equipment is not a gas burner and an oil burner, but consists of a single unit designed to burn both fuels.

Development work on the oil burner has resulted in an extremely simple method of vaporizing the oil, a method in which the oil flows into a shallow pan where it is heated and evaporated by a small gas flame.

Attempts to obtain a combustible mixture by vaporizing oil with heat and then mixing it with air have been made many times, but the present development has resulted in the first really practical, low cost, self-cleaning and odorless burner.

Operation is entirely automatic. The consumer merely fills his oil tank during the summer months with about 275 gallons of fuel oil. The burner is lighted in the fall and all that remains for the consumer to do is to adjust his room thermostat to the desired temperature. An outside thermostat switches over from gas fuel to oil fuel at a predetermined temperature and automatically switches back again to gas as soon as the weather has moderated.

It is believed that sufficient quantities of the unit can be produced in time to at least relieve the peak-load gas and oil problems of the coming winter. Manufacturing estimates show the allowable selling price of the unit will probably be less than that of a comparable oil burning unit beacuse of the small oil tank required.

The Midwest Research Institute is the exclusive licensing agent for the equipment patents. Manufacturers will be licensed on a liberal and non-exclusive basis so as to stimulate production and make the unit available to as large a number of persons as possible.

Roper Issues Automatic Cooking Guide Book

A 16-PAGE booklet covering all phases of automatic gas cooking and containing full-color illustrations has recently been published by George D. Roper Corporation.

Operating instructions complete with explanatory pictures which tell the correct procedures in setting clock control, information on the replacement of inoperative clock controls, five complete automatic oven dinner menus, a reproduction of the Roper time and temperature chart, and a discussion of the length of time foods may remain in the oven before and after cooking, are some of the booklet's many features.

Known as the Automatic Cooking Guide Book, it is available from George D. Roper Corp., Dept. 5, Rockford, Ill., at $15.00 per hundred.

Notes from F. P. C.

● **Texas Eastern Transmission Corp.**, Shreveport, La., has been ordered to continue after April 30, 1948 until further order, the delivery of approximately 20 million cubic feet of gas to Panhandle Eastern Pipe Line Co., Kansas City, Missouri.

Publicity, Advertising, Rate Groups Confer

Publicity and advertising members during conference at Houston, Texas: (standing, left to right) Charles W. Person, J. P. Leinroth, chairman, A.G.A. Industrial & Commercial Copy Committee; R. G. Barnett, chairman, A.G.A. Publicity Committee; J. J. Quinn, chairman, A.G.A. National Advertising Committee; Ray T Ratliff, chairman, A.G.A. Domestic Copy Committee; James M. Beall, R. M. Alderman, George A. McDonald, Emil Hofsoos, Charles A. Tattersall, James I. Gorton; (sitting) L. C. Roberts, Chester L. May, Margo Sherman, W. M. Jacobs, James M. Floyd, Kenneth Fellows, Frank J. Nugent

A.G.A. Rate Committee during two-day meeting at Hershey, Pa. held a symposium on cost anayses: (front row, l. to r.) E. H. Strait, Constantine Bary, Frank P. Hyer, Chairman Frederick C. Beck, Harry A. Weitzman, C. G. Eichelberger, Ira L. Craig; (second row) B. P. Dahlstrom, Gordon C. Griswold, John B. Boniface, Robert M. Keeney, L. R. Lefferson, S. S. Mason, Arthur Schultheis, Frank M. Terry; (third row) Robb Quinby, A. F. Rehberg, R. C. Grimsted, Newell E. French; (top row) Paul F. Hoots, John R. Gardner, Walter E. Caine, S. D. Forward, M. L. Mead, Kurwin R. Boyes, and George A. Morgan

Cost Analyses Discussed by Rate Group

A TIMELY symposium on cost analyses featured a two-day meeting of the American Gas Association -Rate Committee, F. C. Beck, United Gas Pipe Line Co., Shreveport, La., chairman, held in Hershey, Pa., April 26 and 27.

The discussion was headed and arranged by F. M. Terry, Consolidated Edison Co. of New York, Inc., and served to uncover developments in allocation practices as outlined in reports which the committee issued during the 1920's.

Among those who contributed to the discussion were B. P. Dahlstrom, Public Service Electric and Gas Co., Newark, N. J.; N. E. French, Equitable Gas Co., Pittsburgh, Pa.; J. R. Gardner, Central Hudson Gas and Electric Corp., Poughkeepsie, N. Y.; S. S. Mason, Washington Gas Light Co., Washington, D. C.; Robb Quinby, The Brooklyn Union Gas Co., and I. L. Craig and Constantine Bary, Philadelphia Electric Company. A partial bibliography on gas cost of service studies, customer load characteristics and related matters, prepared by Mr. Terry, was distributed at the meeting and copies are available to gas company members of the Association upon request.

A report on customer load characteristic study prepared by a subcommittee headed by Mr. Quinby shortly will be sent to member gas companies. Progress reports were submitted by the following subcommittees: Automatic Adjustment Clauses, L. R. Lefferson, Ebasco Services, Inc., New York, N. Y., chairman; Rate Changes, F. M. Terry, Consolidated Edison Co. of N. Y. Inc., chairman; City Gate Rate Forms, N. E. French, Equitable Gas Co., chairman.

A subcommittee was authorized to develop a standard form of contract for the supply of gas to government emergency projects in cooperation with the proper authorities.

Houston Natural Sponsors Homemakers Institutes

MORE than 496 enthusiastic women attended the 1948 version of Houston Natural Gas Company's Homemakers Institutes which were conducted in the first three of 18 Texas Gulf Coast communities to be visited during April, May and June.

Mrs. Winnell Simmons, home service director, conducted each school, assisted by Sue Foote and Frances Griffith.

Up-to-date methods of food preparation, modern menu planning, proper nutrition, and food budgeting were all included in Mrs. Simmons' lectures. Her demonstrations featured the use of an automatic "CP" gas range and gas refrigerator in the preparation of complete oven, broiler, and top-burner meals.

A special night meeting devoted exclusively to the education and training of dealer and company personnel also was held in each of the three towns visited.

Brooklyn Gets Separate Meter Repair Plant

ESTABLISHMENT of a separate meter repair plant in Brooklyn, N. Y., has been announced by Superior Meter Co., following reconversion and expansion of the firm's new meter making facilities. The repair plant will be under the personal supervision of Fred Gottschling, superintendent, who has served the company for 30 years.

Nebraska Gas Company Welcomes Home Economists

Delegates at Nebraska State Home Economics Convention in Lincoln were entertained at tea by the home service department, Central Electric & Gas Company. Elsie Pierson (right) and Fan Casford were hostesses in the brand new Foods & Nutrition Building, Home Economics Department, University of Nebraska, where students use modern gas equipment in their every-day studies

Supplers Hold Reunion in Houston

Supplers breakfasting during A.G.A. natural gas meeting: (seated, l. to r.) R. D. O'Neil, Birmingham, Ala.; Bert P. Fisher, Houston; John Van Norden, New York; Stephen D. Day and T. P. F. Kelley, Houston; J. E. B. Gibbons, Bradford, Pa.; (standing) James I. Gorton, New York; G. W. Stevenson, Los Angeles; W. W. Hall, Dallas; A. W. Bohne, Evanston; H. O. Andrew, New York; C. T. Davis, Houston

NATURAL GAS MEETING

(Continued from page 6)

approximately 35 percent curtailment during the past heating season." System capacity has been increased approximately 60 percent since the war.

Prospective benefits from removing excess nitrogen from natural gas were analyzed in a paper jointly prepared by P. V. Mullins and R. W. Wilson, Bureau of Mines, Amarillo, summarizing progress to date on a cooperative A. G. A. research project. The authors discussed physical effects and economic benefits of nitrogen removal under typical conditions and gave examples. The figures and benefits cited of transporting nitrogen-free gas emphasize the desirability of developing suitable industrial means for large-scale nitrogen removal operations in connection with transmission of gas from certain nitrogen-bearing natural gas reserves. The investigation is continuing.

The initial paper at the concluding transmission session gave an authoritative account of "Directing Pipe Line Inspection and Maintenance." The authors, J. A. Martin and Luther Tolbert, Lone Star Gas Co., Dallas, concentrated on the extensive maintenance program required for the control of leakage. Valuable control charts, tables, and other supporting data developed by the company to check and double check unaccounted-for gas were presented.

Extensive experience with the interior cleaning of pipelines was summarized by D. K. Stephens, Panhandle Eastern Pipe Line Co., Kansas City, who said that his company is 100 percent "sold" on the economic and operating results of such cleaning during construction and subsequently as flow tests indicate. The largest interior cleaning program undertaken by Panhandle; he noted, was that of 566 miles in 1946 which resulted in recovering capacity of from 12 to 15 million cubic feet per day at a cost of $170 per mile cleaned, exclusive of the cost of the gas lost.

Mr. Stephens described various go-devils and other equipment developed by his company to improve cleaning results. In conclusion, he referred to a new type of cleaning apparatus which is now being developed and which holds promise of exceptional performance.

Two sound motion pictures, shown near the end of the transmission session, proved of outstanding interest to the visiting gas men. The first depicted the fabrication of welded line pipe by A. O. Smith Corp., Milwaukee. The other was a fascinating technicolor film of the Biggest Inch pipeline project for delivering natural gas from Texas to southern California. Entitled "Westward Flow" it showed the step-by-step progress of this pipeline over rugged and scenic terrain, and its final consummation to serve many thousands of customers of southern California gas companies.

A fruitful round-table accounting conference held Tuesday afternoon under the direction of Chairman Peters brought out the latest developments in natural gas accounting procedure. An interesting paper on "Depletion Accounting for Book Purposes" was presented by Thomas F. Cartwright, Amarillo Oil Company. Other topics discussed included underground storage accounting problems, depletion accounting, revision of uniform system of accounts with respect to natural gas by-products, and cost accounting for contract drilling.

At the conclusion of the conference, Chairman Hendee announced the Program Committee for the October meeting of the Natural Gas Department in Atlanta City as follows: Gardiner Symonds, president, Tennessee Gas Transmission Co., Houston, chairman; F. T. Parks, vice-president in charge of gas operations, Public Service Co. of Colorado, Denver, and William Moeller, Jr., vice-president, Southern California Gas Co., Los Angeles. The 1949 Spring Conference will be held May 9-10 at French Lick, Indiana.

"CP" Extended to LP Gas Ranges

USE of "CP" specifications for ranges employing LP and butane-air gases, was recently adopted by the Gas Appliance Manufacturers Association on recommendations made by the Liquefied Petroleum Gas Association, and will result in supplying the LP-gas user with automatic gas ranges built to the high "CP" standards which have proved so effective in increasing consumer acceptance and in building sales of better-grade gas ranges in the natural and manufactured gas industries.

Introduction of the "CP" program into the LP-gas field will not only provide an unbiased quality buying guide to the LP-gas users, but will enable LP-gas range dealers to capitalize immediately on the national acceptance for "CP" built up over ten years of continued intensive gas industry promotion, and the $4 million gas industry promotion behind automatic gas cooking in 1948.

The new "CP" requirements for LP and butane-air gases are, in a large degree, the same as those for manufactured and natural gases, with the exception that "100 percent automatic shut-off" is required on the oven burner, and burner capacities and efficiencies specified are similar to existing American Standards Approval Requirements for LP or butane-air gases.

All of the 19 manufacturers, representing 50 percent of the industry's promotion, who produce "CP" models for manufactured and natural gases, are expected to have "CP" models of the LP type available in the near future.

GAS PRODUCTION RESEARCH

(Continued from page 11)

within limits which the company or industry can afford to sustain through good times and bad. In practical industrial practice the ratio is usually less than five percent of the total research budget.

The additional responsibilities of management in respect to pure research are extremely important but very limited. Management should have the determining voice with respect to choice of the fields of activity or the points of departure. This it does, not by mandate, but by the selection of its researchers.

When it comes, however, to the assessment of results, evaluation of technical performance and judgments upon the scientific values of the information obtained, business management must place its primary reliance upon its technical advisers. If these be inadequate or lack the confidence of management the only alternative is to find new advisers or to get out of fundamental research.

Engineering Research

Matters are quite different with respect to the engineering research projects which normally comprise more than 95 percent of the research budget. Here the shoe is on the other foot. Informed business judgment is paramount. The decisions to be made on major research projects differ in no essential detail from executive appraisals of other intangible business risks. Management goes to the experts to get the essential facts, be they technical or otherwise. Its judgments on the basis of those facts are subject to continual review to meet changing conditions, to exploit successes and to minimize losses. Thus the successful conduct of engineering research depends as much upon the calibre and soundness of executive decisions as upon the technical competence and skills of the research personnel.

Thus far we have dealt with generalizations regarding modern industrial research and their applications to the conduct of association research programs. A detailed discussion of the individual projects of Gas Production Research would be impossible. A few weeks ago in Chicago the Technical Advisory and Supervising Committees sat for two days without covering all the projects in detail.

Figure 2, however, gives a bird's eye view of what is now under way. The projects have been grouped in accordance with their general classifications, rather than in chronological order. It may be noted that the first two classifications, namely process engineering research and analytical research, belong to the general category of applied research and that the last two of the twelve projects listed come under the category of fundamental research. The relatively high ratio of pure research to engineering research is a normal characteristic of new research programs. As further engineering aspects are developed they will tend to absorb increasing amounts of the total research budget, but never to the complete exclusion of the research of curiosity. We have learned from long industrial experience that the higher the levels of executive contacts between the management and research groups have been, the more successful has been the engineering research.

In the early stages of industrial research the promotional and advertising values, which have been exploited so successfully by the electrical industry, for example, were sufficiently persuasive to cause some industrialists to underwrite it for those reasons alone. But it was not until such programs matured and began to strike pay dirt that industrial research became the normal rather than the exception, and that industry learned the lesson that getting the most from industry research dollars was a job for the best research brains.

The A. G. A. has now set up the enabling machinery for such participation in its General Research Planning and Gas Production Research Committees. No member company which neglects to provide adequate representation when opportunity is afforded is entitled to complain of the decisions reached by others.

We have learned that business and research executives have learned to understand each other's problems and to respect each other's functions only by living and working together. We have learned that successful engineering research is quite as dependent upon good business judgment as upon technical ability. As for fundamental research, the only job of management is to see that its research staff contains a leaven of scientific imagination and has a little elbow room in which to use it.

For better or for worse, the research of today holds in its hands the keys to our future. There can be no greater concern than this to these executives to whom that future is entrusted.

Member utilities may not be competitive with one another, but the gas industry as a whole must meet a highly competitive situation. Even if this were not so, our charters to serve the public interest require us to serve to the best of our ability the future as well as the present interest of the consumer. It will be too late if our competitors succeed in doing the job first.

Aware of Needs

That the gas industry is well aware both of its needs and of its obligations is amply demonstrated by its voluntary contributions to the PAR funds, by its constant efforts to insure better research administration, and by its generous support of such technical centers as the A. G. A. Testing Laboratories, and the Institute of Gas Technology.

No one need fear for the future of research in the American Gas Association so long as its ablest business and technical leaders continue to give so generously of their time and experience in the service of its vital commitee assignments.

Rochester Teaches Cooking Instruction

Irene Muntz, home service director, Rochester Gas & Electric Corp., presents diploma to Salesman Joseph Switzer for completing the company's cooking instruction course for salesmen and executives as Salesman Don Dronkers looks on

Personal and Otherwise

Two Promoted by Brooklyn Union

A. B. Huyck

Samuel Green

ELECTION of Ansel B. Huyck as chief engineer, The Brooklyn Union Gas Co., and of Samuel Green as assistant chief engineer, has been announced by the company's board of directors.

Formerly assistant chief engineer, Mr. Huyck has served the gas industry for many years and has been active in work of the American Gas Association particularly in development and research.

He came to Brooklyn in 1931 as assistant superintendent of the coke oven plant at Greenpoint Works. Before that he was associated with Koppers Construction Company and Iroquois Gas Company. He has contributed to many engineering developments which have improved Brooklyn Union's operating practices and equipment design.

Mr. Green has been with the company since 1912 and is a past-chairman of the Gas Production Committee, A. G. A. Technical Section. He has held various posts in the company's engineering division and in December 1945 became engineer of manufacture in charge of the gas production facilities.

Plank and Leslie Advanced By Wilmington Company

TWO new top management positions have been formed by the board of directors, Delaware Power & Light Co., Wilmington, Delaware.

Harvey H. Plank, formerly vice-president and assistant general manager, has been named vice-president in charge of engineering and operations, and Lloyd R. Leslie, formerly commercial sales manager, has been named vice-president in charge of sales and public relations.

Mr. Plank came to Wilmington as assistant to the company's general manager in 1943 and was subsequently elected vice-president. Prior to that time he was associated for many years with The United Gas Improvement Co., Philadelphia, Pennsylvania. In his new position he will be in general charge of engineering and planning and also in charge of operations of the firm's property.

Mr. Leslie joined the company in 1929 as sales manager, having previously spent several years in sales promotion work with Philadelphia Electric Co., Philadelphia, Pennsylvania. He is widely known throughout the Wilmington area.

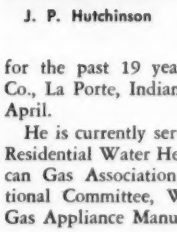
His new duties will include supervision of sales promotion, merchandising and advertising in addition to which he will have general supervision over all matters pertaining to the company's public relations activities.

At the same time announcement was made of the appointment of Frank P. Hyer as supervisor of operations, and of Thomas W. McKenna, formerly supervisor of industrial gas sales, as commercial sales manager.

Oklahoma City Company Announces New President

NORMAN HIRSCHFIELD has been elected president, Consolidated Gas Utilities Corp., Oklahoma City, Oklahoma. Mr. Hirschfield has been a vice-president since 1938. He is also a director of the corporation, which is engaged in the production, transportation and distribution of natural gas in Oklahoma, Kansas, and Texas.

Lawson Makes Hutchinson General Sales Manager



J. P. Hutchinson

APPOINTMENT of Jack P. Hutchinson as general sales manager has been announced by Lawson Manufacturing Co., Pittsburgh, Pa., makers of water and space heating appliances.

Mr. Hutchinson is widely known both in the plumbing and heating industry and the gas industry, and has been associated for the past 19 years with Bastian Morley Co., La Porte, Indiana. He joined Lawson in April.

He is currently serving as a member of the Residential Water Heating Committee, American Gas Association, and the Sales Promotional Committee, Water Heating Division, Gas Appliance Manufacturers Association.

Philadelphia Electric Appoints Vice-Presidents

K. M. Irwin

H. N. Ramsey

ELECTION of K. M. Irwin and H. N. Ramsey as vice-presidents, Philadelphia Electric Co., Philadelphia, Pa., has been announced by Horace P. Liversidge, chairman of the board.

Mr. Ramsey, elected vice-president in charge of purchases, insurance, and real estate, entered the utility field as an engineer with the American Gas Co., and later joined the engineering staff, The United Gas Improvement Company.

He served with United Engineers & Constructors, Inc., in 1931, and three years later became president, Welsbach Company. He has been purchasing agent of Philadelphia Electric since 1941.

He is a member of the American Gas Association, the Pennsylvania Gas Association and the National Association of Purchasing Agents.

Mr. Irwin, named vice-president in charge of engineering, graduated from the Yale Sheffield Scientific School, and after World War I joined The United Gas Improvement Company as a mechanical engineer. Transferred to Philadelphia Electric in 1931, he was subsequently appointed manager of the engineering department, a position he held when elected to his present post.

Mueller Furnace Lists Appointments

SEVERAL personnel appointments have been announced by L. J. Mueller Furnace Co., Milwaukee, Wisconsin. Ronald F. Marsden has been named director of purchases while E. R. Stemper, who has been director of purchases for many years, will remain in a consulting capacity.

Elmore T. Scheck, has rejoined the organization as Milwaukee sales manager. Mr. Scheck has been with the furnace company for more than 20 years.

Harold B. Smith, Boston, Mass., has been appointed eastern district sales manager. Previously Mr. Smith served with Lennox Furnace Co., Syracuse, N. Y., and before that with Consolidated Gas Co. of New York City, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., and Carrier Corp., Boston, Massachusetts.

Roberts & Mander Fills Sales Promotion Post

H. E. Fritz

HERBERT E. FRITZ has been named sales promotion manager, Roberts & Mander Corp., Hatboro, Pennsylvania.

Mr. Fritz has been connected with Roberts & Mander since 1938 and has served successively as credit manager, service manager, and sales representative. He will spend major portion of his time in the field.

Texas Eastern Honors Thompson and Cox

Mills Cox

CHARLES I. THOMPSON, Philadelphia lawyer, has been elected a director, Texas Eastern Transmission Corp., Shreveport, La., owner and operator of the Big Inch pipeline system.

During the war Mr. Thompson was vice-president and general counsel, War Emergency Pipe Lines, Inc., and has specialized in pipeline problems.

Mills Cox has been appointed manager of supply for Texas Eastern. Mr. Cox has been active in the oil and gas business for 26 years.

Edmund Retires from Coast Counties

H. W. Edmund

HARVEY W. EDMUND, vice-president, Coast Counties Gas & Electric Co., San Francisco, Calif., has retired because of ill health. Mr. Edmund served as president, Pacific Coast Gas Association, in 1946.

He started in the utility business as a cadet engineer with Western United Gas and Electric Company at Aurora, Ill., and later became manager of the sales department. After World War I he returned to Western United as manager of the company's coal mines in West Virginia.

Mr. Edmund's interest in appliances prompted him to leave the utility field first to head the appliance department of a furniture store chain in the Middle West and later to develop and manufacture gas ranges and water heaters in St. Louis.

In 1931 he accepted a position with the Coast Counties group and in 1933 was made sales manager. In 1942 he became a director and was made vice-president and general manager. In 1947 he was transferred to the San Francisco Office as vice-president in charge of sales, advertising and purchasing.

White Joins Rodic Rubber

JOHN H. WHITE, JR., formerly director of promotion, American Gas Association, has been appointed vice-president and general manager, Rodic Rubber Corp., New Brunswick, N. J., one of the world's largest makers of typewriter platens and business machine rolls.

During the war Mr. White was chief of administration and manufacture at Piccatinny Arsenal with the rank of Army colonel. He was formerly owner and operator, Hamlin Canning Co., Inc., Rochester, New York.

Gas Man Promoted to Brigadier General

WILLIAM L. PLUMMER, southern division manager, George D. Roper Corp., Rockford, Ill., has been promoted from colonel to brigadier general, United States Air Force Reserve. It was Colonel Plummer who on April 23, 1943 presented the Army-Navy "E" award to Roper employees.

Liversidge Marks 50 Years With Philadelphia Utility

H. P. Liversidge

HORACE P. LIVERSIDGE, chairman of the board, Philadelphia Electric Co., has observed his fiftieth year of service with the system in which he started as a wiring inspector.

Mr. Liversidge, long known as an exponent of inter-related effort in the industrial field, was elected president of the Philadelphia Electric Company in 1938 and chairman of the board in 1947.

County Gas Appoints New Top Management

NEW officers for County Gas Co., Atlantic Highlands, N. J., have been announced following sale of the company by Public Service Corp. of New Jersey on May 12.

James S. Abrams, Jr., has been elected president, Kenneth Knoblock and Irving Koertner have been named vice-presidents, and Frank O'Neill, treasurer. Other appointments include Van R. Sholem as secretary and general manager, and Robert Abrams, assistant secretary and assistant treasurer.

Pacific Gas & Electric Positions Filled

O. R. Doerr

L. H. Anderson

N. R. Sutherland

APPOINTMENT of vice-presidents L. Harold Anderson and Norman R. Sutherland to newly-created positions as assistant general managers, Pacific Gas & Electric Co., San Francisco, Calif., has been announced by James B. Black, president. They will be executive assistants to William G. B. Euler, vice-president and general manager.

Mr. Black also announced that O. R. Doerr, sales manager for the past ten years, has been appointed vice-president in charge of sales to fill a post vacated by Mr. Sutherland.

Mr. Anderson, a former president, California Public Utilities Commission, has served as vice-president of the company since August 1946.

Mr. Sutherland, formerly manager of the company's San Francisco division, was vice-president in charge of sales and public relations prior to his new appointment.

Mr. Doerr became identified with the company in 1921 when he joined the sales department, Great Western Power Company in Oakland, a corporation which merged with Pacific Gas & Electric in 1930.

The new vice-president is currently president, San Francisco Sales Managers Association. He is a past-president, Pacific Coast Gas Association, and a member, American Gas Association and the National Federation of Sales Executive.

Associated Organization Activities

Mid-West Gas Association Elects Slate of Officers

A. C. RATHKEY, Iowa Public Service Co., Waterloo, Ia., was elected president, Mid-West Gas Association during the recent convention in Minneapolis. Lester J. Eck, Minneapolis Gas Light Co., was chosen vice-president, and D. J. Reimers, Minnesota Valley Natural Gas Co., St. Peter, Minn., second vice-president. Harold E. Peckham, Northern States Power Co., St. Paul, Minn., was reelected secretary-treasurer.

Gas men were elected to represent the Mid-West Gas Association on American Gas Association managing committees as follows: Technical Section—J. T. Innes, Northern Natural Gas Co., Omaha, Neb.; Accounting Section—D. W. Peterson, Minneapolis Gas Light Co.; Residential Gas Section—J. T. Schilling, Iowa Power & Light Co., Des Moines, Ia.; Industrial and Commercial Gas Section—C. F. A. Schuldt, Northern States Power Co., St. Paul.

Vernon Myers, South Dakota Public Service Co., Sioux City, Ia., will represent the association on personnel, and E. Carl Sorby, George D. Roper Corp., Rockford, Ill., on publicity and advertising. John J. Burnett, The Foxboro Co., Chicago, Ill., will act as representative to the Manufacturers' Section.

P. C. G. A. Holds Annual Workshop

SAN FRANCISCO was headquarters on March 24 and 25 for the Home Service Workshop sponsored by the Pacific Coast Gas Association, in cooperation with the Home Service Committee, American Gas Association. Thelma Fahrenkrog, home service director, Coast Counties Gas and Electric Company at Santa Cruz, presided in her capacity as chairman of the home service group.

Functioning as a part of the Domestic Sales Section of the Pacific Coast Association, the conference was opened by F. M. Foster, Southern California Gas Co., Los Angeles, Calif., who pointed up a growing list of activities which tie home service closely to the sales organization in each gas company.

Equipment promotion was presented by representatives of several manufacturing companies, as follows: Developments in Year-Around Home Air Conditioning—D. W. Merkeley, engineer, Servel, Inc., Evansville, Ind.; Pre-Testing Gas Refrigerator Design—Seward Abbott, western manager, Servel, Inc.; Developments in Clock Control Cookery—S. G. Eskin, director of research, Grayson Controls Division, Robertshaw-Fulton Controls Co., Lynwood, Calif.; The Story of Detergents and their Proper Use—James M. Cloney, western division manager, Antara Products Division, General Analine and Film Corporation.

"Trends in Presentation of Home Economics Material" was discussed by Lou Richardson, consultant in San Francisco, and "New Trends in Baking and Mixes" by Ellen Pennell, Pillsbury Mills, St. Paul.

Gladys Price, Southern California Gas Co., discussed the "Dramatic Touch in Demonstration," and as a luncheon speaker, Jessie McQueen, A. G. A., presented a "Home Service Review."

Wisconsin Home Service Conference

AN important two-day conference of the Home Service Committee, Wisconsin Utilities Association, was held May 18 and 19 in Madison, Wisc., with headquarters in the Madison Gas and Electric Company's home service auditorium. Kathryn Heffernen, Wisconsin Public Service Corp., Green Bay, is committee chairman.

The address of welcome was presented by W. E. Schubert, association president; "The Importance of Home Service Today" was given by J. D. Howard, sales manager, Wisconsin Power and Light Co.; "Facts to Know About Our Companies" was presented in two parts by Fred E. Ericksen, advertising manager, Wisconsin Electric Power Co., Milwaukee, and A. G. Bur, sales manager, Wisconsin Public Service Corporation at Green Bay.

Two symposiums on home service were directed by representatives of the eight utility companies registered at the conference. The first was entitled, "Home Service Creates Better Public Relations," and the second, "How my Home Economics Training Fitted Me for Home Service."

Mrs. Vera Ellwood, Wisconsin Electric Power Co., discussed the subject "Home Call Techniques," and "County Home Agent Cooperation with the Home Service Agent" was presented by Mrs. Grace Duffy, University of Wisconsin.

Sutton Names Chairmen For P. C. G. A. Convention

A. H. SUTTON, president, Pacific Coast Gas Association, has appointed A. E. Strong, vice-president, Coast Counties Gas & Electric Co., Santa Cruz, Calif., as general chairman of convention arrangements, and L. Harold Anderson, vice-president, Pacific Gas & Electric Co., San Francisco, Calif., as chairman of the association's program committee.

Indiana Gas Group Elects New Head

L. B. Schiesz

A. E. Hatley

MEMBERS of the Indiana Gas Association elected Louis B. Schiesz, president, Indiana Gas & Water Co., Inc., president succeeding Dean T. Burns, Citizens Gas & Coke Utility, during the record thirty-eighth annual convention at French Lick Spring Hotel, French Lick, April 22 and 23. Theme of the meeting was "Gas Has Got It!"

A. E. Hatley, sales manager, Central Indiana Gas Co., Muncie, was made vice-president, and Clarence W. Goris, Northern Indiana Public Service Co., was reelected secretary-treasurer. The new president, Mr. Schiesz, was formerly vice-president of the association, and is a director, American Gas Association, and Independent Natural Gas Association of America.

Thursday's session featured a fast-moving presentation "It's Time to Get Ready to Sell Again," by Frank W. Williams, secretary, A. G. A. Residential Gas Section, assisted by Phil Atlas, Northern Indiana Public Service.

Commissioner Lawrence W. Cannon, Public Service Commission of Indiana, discussed utility regulation in the natural gas industry. Experiences of gas companies throughout the country in solving various problems were presented by A. C. Cherry, The Cincinnati Gas & Electric Co., and chairman, A. G. A. Technical Section.

Dr. J. L. Bray, Purdue University, brought the members up to date on the Indiana Association's research activities conducted by the university, and H. E. Jalass, general sales manager, Cribben & Sexton Co., Chicago, Ill., dramatically showed the superiority of gas as a cooking fuel.

The following Indiana Gas Association representatives were named to A. G. A. managing groups: Accounting Section—J. C. Holinko, Richmond Gas Corp., Richmond; Technical Section—T. N. Spencer, Central Indiana Gas Co., Residential Sales Committee—G. W. Hoss, Kokomo Gas & Fuel Co., Kokomo.

G.A.M.A. Announces Division Chairmen

LEADERS in the gas industry appointed to head special projects and divisions of the Gas Appliance Manufacturers Association during the 1948-49 season were announced recently by Harold Massey, assistant managing director, following the annual meeting in Chicago.

G.A.M.A. activities will be spearheaded by the following chairmen: Controls and Related Accessories Division—John A. Wolff, sales manager, Milwaukee Gas Specialty Co., Milwaukee, Wisc.; Direct Heating Equipment Division—L. O. Reese, vice-president and general manager, Armstrong Products Corp., Huntington, W. Va.; Domestic Gas Range Division—W. Frank Roberts, president, Standard Gas Equipment Corp., Baltimore, Md.; "CP" Manufacturers Group—A. B. Ritzenthaler, vice-president, The Tappan Stove Co., Mansfield, Ohio.

Other division and group chairmen are: Gas House Heating and Air Conditioning Equipment Division—Frank L. Meyer, president, The Meyer Furnace Co., Peoria, Ill.; Gas Air Conditioning Group, John K. Knighton, manager of sales, Servel, Inc., Evansville, Ind.; Gas Broiler Group—C. L. Hewitt, Jr., general sales manager, L. J. Mueller Furnace Co., Milwaukee, Wisc.; Gas Conversion Burner Group—E. A. Norman, Jr., president, Norman Products Co., Columbus, Ohio.

Also Gas Furnace Group—Keith T. Davis, chief engineer, Bryant Heater Co., Cleveland, O.; Gas Meter and Regulator Division—A. F. Benson, vice-president in charge of production, American Meter Co., Erie, Pa.; Gas Valve Division—Philip S. Harper, president, Harper-Wyman Co., Chicago, Ill.; Gas Water Heater Division—Leland M. Feigel, sales manager, Water Heater Division, Servel, Inc., Evansville, Ind.; Hotel, Restaurant and Commercial Gas Equipment Division—Walter H. Rudolph, president, Savory Equipment, Inc., Newark, N. J.; Industrial Gas Equipment Division—Alvin M. Stock, Partlow Corp., New York, N. Y.

New Jersey Home Service Workshop

THE Home Service Committee, New Jersey Gas Association, held a one-day conference in Newark, N. J., April 20, called by the chairman, Sarah Sicker, home service director, South Jersey Gas Company at Atlantic City.

"Gas Goes to School," was the subject of an interesting round-table discussion with Helen Farrell, Public Service Electric & Gas Co., Camden, taking the part of moderator. Participants included John McSharry, administrative chairman of Adult Schools, Newark; Ethel M. Powell, supervisor of home economics, Public Schools, Atlantic City; Elizabeth H. Gunn, assistant supervisor of home economics, Public Schools, Newark; Beatrice Cole Wagner, home service director, The Philadelphia Gas Works Co., and E. Carl Sorby, vice-president, George D. Roper Corp., Rockford, Illinois.

A talk entitled "Getting into Hot Water" was delivered by William J. Schmidt, general sales manager, Long Island Lighting Co., Mineola, Long Island. "The News" about gas ranges was presented by Paul Berno, promotion manager, The Tappan Stove Co., Mansfield, Ohio. Jessie McQueen, American Gas Association, discussed "A Spotlight on Home Service," and closing the program, Mrs. D. G. MacDougal, B. Altman & Co., New York, N. Y., spoke on "The Men in Your Life."

Achievement

● When Charles M. Schwab had not yet become a great man in his own right in the field of steel, he worked for Andrew Carnegie. The little Scotsman taught him one of the hard lessons of the commercial world. "All records broken yesterday," Schwab wired his chief. In reply, Carnegie telegraphed: "What have you done today?"

—Coal Heat

The Nationalization of Gas

(From *The New Statesman and Nation*)

● Following are two prize winners in a competition for a Chestertonian poem on the nationalization of gas in England:

I

Bob Boyle was son to the Earl of Cork,
and he wasn't a gilded ass,
But a jolly Christian gentleman who
went in strong for gas,
And he found a Law which God set
up,—and a pity it is he's dead,
For if Bob had spoken in Parliament
we know what he'd have said:
"You may rationalize and nationalize,
but whenever you come to measure
You'll find the volume varying inversely
with the pressure!"
When Boyle was dead a hundred years,
then up spoke Gay-Lussac:
"When gases begin expanding, I don't
care which I back,
"For they all expand alike," quoth he,
"at 0 degrees of C.,
"In the latitude where Paris is, at the
level of the sea.
"You may rationalize or nationalize,
but you'll never be able to strike
"At the Will of God (be it never so
odd) that all gases expand alike!"

L. E. J.

II

Old Noah he sits in an English Inn
with a flagon of English ale,
And little he recks of the rasping rain
and the rush of the roaring gale;
But the laughter dies, and the songs are
hushed when a smug politician
begins
To groan of the Government grabbing
the gas, and their other enormous
sins.
Then Noah he thumps on the table and
shouts in a voice to awaken the
dead,
"I don't care where the gas may go if it
doesn't get into my head."
"Good fellowship lives whatever the
light—come fill up the flagons
again—
"The only gas that is dirty and dim is
the gas of the Parliament men.
"They may nationalize the sun," says
he, "and the moon and Aurora's
ring,
"But the sons of God shall shout for
joy while the morning stars still
sing.
"Gas ovens are made for the millionaires who dare not die in bed,
"But I don't care where the gas may go
if it doesn't get into my head."

E. W. FORDHAM.

Obituary

HAZEL FLORENCE KING, librarian, American Gas Association, died in Hackensack, N. J., Sunday, May 16, following a brief illness.

Miss King was born in Somersworth, N. H., and graduated in 1923 from Wheaton College, Massachusetts. She later taught at Cape May, New Jersey.

She graduated from the Library School, Drexel Institute, Philadelphia, Pa., after which she accepted a library position in Greensboro College, Greensboro, N. C., where she served four years. Miss King then spent a year as librarian at Irvington High School, Irvington, N. J., and after that, one year as librarian at Carlton College, Northfield, Minnesota. She later worked for eight years at Montclair Public Library, Montclair, New Jersey.

During the war Miss King was employed as a technical librarian at Eglin Field, Florida. After leaving Florida she served as librarian for the American Gas Association from January 2, 1945 until May 4, 1948, the date of her illness.

She was active in the Womens' College Club and The Friends of the Library.

TEN YEARS UNDER THE NATURAL GAS ACT

(Continued from page 18)

You are familiar with the events following the introduction of proposed amendments in the House of Representatives by Congressmen Rizley, Oklahoma, and Carson, O., and in the Senate by Senator Moore, Oklahoma. Hearings were held before the House Committee on Interstate and Foreign Commerce in April and May 1947, and before a subcommittee of the Senate Committee on Interstate and Foreign Commerce April 29 and July 1, 1947.

The House Committee reported H.R. 4051, a revised bill, with a recommendation for passage. The bill came up for consideration July 11, was debated and finally passed by a vote of 254 to 64. In the Senate the subcommittee reported the bill favorably but the full committee on July 17, 1947 voted against reporting it out. Subsequently additional hearings were held before the Senate subcommittee February 4-18, 1948, which reported the bill with numerous changes to the full committee April 1. A minority report was submitted by Senator Stewart, Tennessee. What action the full Senate committee will take now is anybody's guess but it is expected to give consideration to the matters shortly.

The bill reported by the Senate subcommittee holds to the jurisdictional lines of the Rizley Bill, but adopts the proposal of Commissioners Smith and Wimberly which substitutes "commodity value" for "prevailing field price" for the allowance to a natural gas company for its own produced gas.

The general purpose and scope of the bill are stated thus:

"The purpose of the bill is to clarify, rather than alter in any fundamental way, the original intent of the present Natural Gas Act, which provides for the regulation of interstate pipe-line companies, with specific reference to their transportation or sale for resale of natural gas in interstate commerce. Its objectives are (1) to define more clearly the exempt status of producers and gatherers as well as local distributors, (2) to specify the standards to be used by the Commission for rate purposes with respect to gas produced by natural-gas companies in recognition of the fact that the production of natural gas is not a utility function, and (3) to provide a more definite service obligation on the part of natural-gas companies."

The first objective is accomplished by a clear statement of the jurisdiction of the Commission and a series of definitions. That there is need for a clarification of the status of the producer no longer is controverted even by the opponents.

On February 23, 1948, Commissioners Olds and Draper submitted additional material for the record in a letter to the committee which referred to the Columbian Fuel Corporation case, the reliance which producers had placed upon it, and admitted grudgingly that the case of Interstate Natural Gas Company v. Federal Power Commission[11] had created some consternation among producers. Accordingly, there was suggested a specific amendment to the Act which also appears as a part of the minority report submitted by Senator Stewart.

Far from relieving the doubts of producers, this provision would make it clear that whenever the Commission decides that the prices of gas in the field are too high it can exercise full and complete jurisdiction over the rates charged by producers, whether or not affiliated, if certain findings are made. These are:

"(1) that by reason of affiliation, or price-fixing agreement, arrangement, understanding, scheme or other device, or dominant position in a producing field or fields there is liable to be an absence or restraint of free and independent competition, or (2) that there is an absence of arm's-length bargaining in such transactions . . ."

The Commission could then determine it is necessary or appropriate in the public interest for the protection of ultimate consumers to regulate the sales of natural gas to a natural gas company, and could fix the price to be charged for the gas sold

"by a person or persons engaged only in the production, gathering or processing of natural gas, including the production, gathering or processing thereof as an incident to the production of oil . . ."

Certainly this proposal of Commissioner Olds clarifies the status of the producer, making it clear that he constantly is under potential price regulation. Doubts would be removed and the protection to producers temporarily afforded by Order No. 139 entered August 7, 1947 would be ended. That order, by administrative interpretation declared certain sales and the producers making them not subject to regulation. Commissioner Draper dissented. Although Commissioner Olds supported

RADIANTS AID BROILERS

(Continued from page 26)

broiler pan than they were for the rectangular burner. Heat distribution patterns for bar and square burners are shown in Figure 4.

Together with the general broiler design relationships previously discussed, the study opens new avenues of approach to improvement of the domestic gas range. Further research on the life and serviceability of radiant materials exposed to high temperatures appears to offer distinct possibilities toward this objective.

TABLE 1. SUMMARY OF EXPERIMENTAL EFFECTS OF RADIANTS ON BROILER PERFORMANCE

Type of Radiant	*Preheating Time*	*Maintaining Rate*	*Heat Distribution*	*Placement and Width*
Clay	Light weight type gave maximum reduction over no radiants of 18.8%	Heaviest most effective. Decrease from lightest to heaviest was 6.3%	Lightest most effective. Increase in highest heat zone over no radiants 311%	Horizontal 1½ in. below ports. 2.75 inch width for 14,000 B.t.u. input
Wire	Similar to light clay radiants	Higher than other Radiants but less than no radiants	Comparable to light clay Radiants	Same as above
Metal Plate	Similar to light clay	Lowest and similar to heavy clay	Comparable to light clay radiants	Extended three inches on either side of burner

the order, it is now clear on the record that he would vote to revoke the exemption thereby provided whenever he felt that a producer's sales price to a non-affiliated pipeline was a "monopoly price," as he terms it. Unless the Act is amended, jurisdiction over producers under the Olds theory will be exercised under rules laid down by the Commission rather than by Congress.

The amendments now proposed by the Senate subcommittee do these things:

Section 1 of the Act is amended specifically to limit the jurisdiction of the Commission to the interstate transportation of natural gas for resale and to sales for resale after the beginning of such transportation. The Commission is not to have jurisdiction over any operation so excluded from its authority whether carried on by a natural gas company or anyone else. This jurisdictional statement is basic in the law. When read with the definition sections there can be no doubt but that the Commission will be excluded from exercising any authority over production properties, including the sale of gas therefrom, whether owned by a natural gas company or by one who has no pipeline operations. Once the gas has been delivered to the transmission facilities of a natural gas company then the subsequent transportation and any sale made from that pipeline can be regulated in all respects provided for by the present law.

Jurisdiction will extend until the gas has finished its actual movement across state lines and has arrived in the state of distribution. The definitions make it clear that a distribution company which receives such gas in its transmission lines located wholly within the state where the gas is distributed is not subject to jurisdiction even though such gas moves some distance within that state before it is actually put into the local service lines.

These restrictions on the jurisdiction of the Commission are objected to strongly in the minority report of Senator Stewart which seems to be based upon the testimony of Commissioner Olds and an announced desire for larger and further extensions of federal control both in the field of production and the area of distribution. These proposals, however, have the complete support of several state commissions and of the National Association of Railroad and Utility Commissioners. Surely it cannot be contended that those State authorities are wholly without concern over the public interest of their consumers. There has been no justification anywhere in the entire record for retaining within the federal regulatory power local distribution companies which as an incident to their local service must move gas into their distribution areas from points of connection with an interstate pipeline.

The main point of controversy revolves around the proposal to allow to a natural gas company a value for gas which it produces instead of a return of the investment through amortization and depreciation plus a six percent allowance on the unamortized investment in production property. The principle proposed by the Rizley Bill was the allowance of the prevailing market prices in the fields where produced. Chairman Smith and Commissioner Wimberly proposed a substitution which would allow a natural gas company the reasonable "commodity value" of gas it produces which would be determined by comparison with other gas in the same field of comparable quality, volume and pressure, delivered under similar conditions and with appropriate weight given to all of the various contracts and prices arrived at by independent bargaining between competing buyers and sellers. The commissioners favoring this proposal have stated that the present cost method is not economically sound or equitable.

The fairness and justice of such treatment would seem evident to any unprejudiced person. The farmer in Texas raising wheat or cotton is assisted by the Federal Government in obtaining a price approaching parity with other commodities. The same Federal Government acting through the F.P.C. seeks to prevent the owner of natural gas under that same Texas soil from realizing the commodity value, and limits him to a price related to costs incurred in some instances 30 years ago. It is important to note that since the Natural Gas Act has been in effect no owner of gas reserves has sought to build an interstate pipeline and no interstate pipeline company has acquired its own gas reserves.

Remaining portions of the bill prescribe the methods to be used in allocating costs between the operations subject to and not subject to jurisdiction, create a public utility service obligation on the part of natural gas companies which is not now written in the law and broadens the authority of the Commission in issuing temporary certificates and requiring temporary interconnections between gas companies.

Until the Natural Gas Act is amended in accordance with the minimum proposals now approved by the Senate Subcommittee there will continue to be dissatisfaction on the part of the consumers who cannot get all the gas they want, and unwillingness of producers to dedicate their reserves for long periods of time for the furnishing of natural gas for consumption in distant markets.

Can producers be expected to put their heads in the noose of potential jurisdiction now claimed by Commissioner Olds, who objects to any amendment of the Act curtailing his right to draw the noose tight?

If the producers, transporters and distributors keep a united front, a review of the second ten years under the Natural Gas Act will point with pride to a decade of improved service to consumers under just and equitable regulation.

Indiana Company Honors Employee Magazine Staff

L. O. Baker (right), receiving pin in recognition of 11 years of reportorial work on "The Gas Flame," employee publication, Citizens Gas & Coke Utility, Indianapolis, Ind., from B. Morgan Scherer, public relations director and editor

[1] R. R. Comm. vs. Pacific Gas & Elec. Co., 302 U. S. 388.
[2] Driscoll vs. Edison Light & Power Co., 307 U. S. 104.
[3] F. P. C. vs. Nat. Gas P. L. Co. of Am., 315 U. S. 575.
[4] Hope Nat. Gas Co. vs. F. P. C., 134 F. (2nd) 287.
[5] F. P. C. vs. Hope Nat. Gas Co., 320 U. S. 589.
[6] Panhandle Eastern P. L. Co. vs. F. P. C., 324 U. S. 635.
[7] Colo. Inter. Gas Co. vs. F. P. C., 324 U. S. 481.
[8] Order No. 130, issued March 29, 1946.
[9] In the matter of Texas Eastern Transmission Corp., F. P. C. Docket G-880, Opinion No. 157.
[10] Statement made February 6, 1948.
[11] Interstate Natural Gas Co., vs. F. P. C. 331 U. S. 682.

FOOD COST CLINICS

(Continued from page 31)

the sponsoring gas company. The other form is a more complete five-session series with one session a day for five days. In addition to the formal sessions, Mr. Wenzel conducts a consultation session on the morning of each clinic day. He also gives a talk for housewives in which he explains how to judge quality in food, when to buy certain foods, and the use of cheaper cuts of meat.

This program enables the sponsoring gas company to get together with its volume cooking customers and tell them how much their business is appreciated. It also affords an opportunity to show the American Gas Association's commercial cooking film, "Where Food Is Finest," which will be available in the fall when the clinics are being given. Some of the participating gas companies are also planning to conduct exhibits of commercial gas cooking equipment during the period of the clinics.

Price of the course when sponsored by a restaurant association usually ranges from $5 to $15 per registrant, depending on the size of the class. Additional information can be obtained from John J. Bourke, director, Commercial Gas Cooking Promotion, A. G. A. Headquarters.

CENTRIFUGAL COMPRESSORS

(Continued from page 15)

units in separate buildings, but I am speaking of a system designed originally for the use of these compressors for the capacity to be handled.

The auxiliary equipment on our line at the present time requires more attention, as a matter of fact, than the compressors and motors themselves but as improvements are developed for the seal oil system, this too will become more and more simple.

If the speed is constant, any variation in delivery is accomplished by a slight change in the delivery pressure. Usually, a small rise in pressure as the delivery falls off and a small drop in pressure if the capacity increases. There is a point on the characteristic curve of these machines below which the operation is not steady and pulsations or surging of the gas occurs.

Operation of these machines in the unstable range can still be effected by several types of regulation. First by a reduction in speed which produces rather limited results. Second, by throttling of the suction valves producing a lower inlet pressure to the machine; or, third by returning some of the gas from the discharge back to the suction. These last two methods produce very good results but waste horsepower. Another method which has limited application is by the use of adjustable inlet guide vanes.

As a general rule, it is not desirable to operate the compressors in this unstable region for any length of time. We can speak from experience on this subject for in order to get the capacity of our system up to the final design as approved by the Federal Power Commission we have had to operate for several months in this condition.

After a line is in full operation the compressors should be self regulating from slightly overrated conditions down to 50 percent of rated capacity. We are installing along our line several stations using reciprocating engines at which we expect to do most of the regulation that will be necessary for the pipeline and thus allow the centrifugal stations to operate by self regulation.

Summarizing briefly the major points discussed concerning the use of the centrifugal compressor for long distant gas transmission lines, we find that these machines are:

1. Essentially large capacity and low ratio per stage.
2. Self regulating over a wide range of capacity.
3. Small maintenance and operating cost other than fuel.
4. The stock of spare parts required at a station is very small.
5. The reliability of rotating machinery makes them conducive to high line load factors.
6. The machines are very adaptable to automatic operation and to the most economical compression ratios.
7. Only a small number of units are required at any station.

We have estimated how much it will cost to install this equipment but we still do not know the full value of any station since we are using so much of the property which had already been installed and we have not had time to completely reclassify our entire plant.

It is estimated that the cost will be from $60 to $95 per horsepower to install these compressors at the former oil pump stations. These figures are based on our most recent estimates which contemplate increasing the capacity of the system by 75,000 M.c.f., bringing the total capacity to 508,000 M.c.f. To do this will require additional compressors at each station. Some of the motors will have to be rewound and some new motors will be purchased. In most stations we shall install ten to 12 units where formerly these were only six oil pumps so that a considerable amount of new construction will be required in making these installations.

Of course, we have not had enough time to develop operating costs for this equipment but all of our studies and es-

Consolidated Edison Marks New Milestone

Hudson R. Searing (left), executive vice-president, Consolidated Edison Co. of New York, Inc.; Ralph H. Tapscott (center), president, and Melville T. Chandler, secretary, examining original papers from the utility's files which incorporated the Gas Light Co. of the City of New York 125 years ago. The company was the first of a group which is now consolidated in Consolidated Edison Co. of New York, Inc.

timates have indicated that this will be in the neighborhood of $6 to $7 per horsepower per year, not including fuel or power. This is about one-half of the corresponding cost for reciprocating equipment.

The designs of the units which are being manufactured for Texas Eastern are all based on an over-all system efficiency of 67-70 percent. By system efficiency is meant over-all thermal efficiency which includes all mechanical losses of the compressor and also the losses through a valve on the suction and discharge of each machine. We have made very careful field tests on these compressors at actual operating conditions and have confirmed this efficiency very satisfactorily. We have not tried to isolate the actual efficiency of the compressor since field operating conditions require the system losses, and we have therefore, predicated all of our studies on the basis of this efficiency.

Performance Favorable

Texas Eastern's experience with their units to date is quite interesting. We now have in operation at various stations along the line a total of 43 units. All of the same design. We have had some difficulties. We don't deny that but we have also pumped a lot of gas and are pumping today at a delivery rate of sales better than 310,000 c.f. and this, just one year and four days after taking possession of the property. One of our units placed on the line November 13, 1947 has never been down for any reason except power interruption to the station.

We are operating all of our units as mentioned previously within the unstable region of capacity. We believe this has contributed more than any other single factor to our difficulties. It is also very probable that these are the only units in this country or perhaps in the world that are continuously operating in an unstable region.

In addition, our stations are being operated in parallel. In other words, we have three units in the pump house on the 24-inch line and three units in the pump house on the 20-inch line, with a common suction and a common discharge, and this is a very difficult operation for centrifugal equipment at certain points on the characteristic curves.

Our line load factors are quite interesting. Beginning operation of the stations in November 1947, the load factor was 88 percent. In December 92 percent, January 93 percent, February 91 percent, and in March 93 percent. This is indicative of fairly constant operation.

Another criterion for the measurement of the performance of these machines is the electric load factor which is quite important in determining the rate at which the power is obtained. In November, the first month of operation, this load factor was 44 percent. In December, it jumped to 63 percent, at which time three stations were in operation. During January, with three stations in operation, this load factor jumped to 82 percent with one station having an electric load factor of 96 percent. In February, with five stations it was 65 percent and in March with seven stations it was up to 75 percent.

The important thing is that in spite of the fact that this equipment is brand new with no operating experience behind it and with all of the difficulties which are attendant to any type of new machinery when first placed into operation, we believe the performance has been exceptionally good.

On February 16 of this year Texas Eastern filed an application with the F.P.C. asking for authority to further increase the capacity of our system to 508,000 c.f. of sales per day. This will be accomplished by adding additional compressors at both the centrifugal and reciprocating stations throughout their system and will not require any looping or new stations. Upon the completion of this program, we would have a total of 107 centrifugal units on our system with a total connected horsepower of 165,750. The total horsepower on the system would be approximately 240,000 with reciprocating engines supplying the difference.

We believe that the centrifugal compressor has a very definite place in the long distant transmission of gas and that the near future will see additional applications of these machines. There will undoubtedly be further changes and modifications in the equipment as continued operation reveals its characteristics and its strength and its weaknesses, but more operating experience will only tend to improve its performance. The prime movers for the compressors will also receive a great amount of consideration and investigation.

Convention Calendar

1948

JUNE

1-6 •L.P.G.A. Annual Convention and Trade Show, Sacramento, Calif.
7 •A. G. A. Southwest Personnel Conference, Birmingham, Ala.
8-11 •The Institute of Gas Engineers, London, England
9 •A. G. A. Midwest Personnel Conference, Kansas City, Mo.
21-24 •American Home Economics Association, Annual Meeting, Minneapolis, Minn. (A. G. A. will exhibit)
21-25 •American Society for Testing Materials, Book-Cadillac Hotel, Detroit, Mich.

JULY

June 30-July 3 •Canadian Gas Association, Annual Convention, Jasper Park Lodge, Jasper, Alberta
12-13 •Michigan Gas Association-Michigan Electric Light Association, Grand Hotel, Mackinac Island

SEPTEMBER

10 •New Jersey Gas Association, Hotel Monmouth, Spring Lake, N. J.
13-14 •Mid-West Gas Association, Twenty-Fifth Gas School and Conference, Iowa State College, Ames, Iowa (Hotel Sheldon-Munn)
14-16 •Pacific Coast Gas Association, Hotel Casa del Rey, Santa Cruz, Calif.
20-22 •National Butane-Propane Association, annual convention and trade exhibit, Congress Hotel, Chicago, Ill.

OCTOBER

Week of October 4 •A. G. A. Annual Convention and G.A.M.A. Exhibit, Atlantic City, N. J.
14-15 •Texas Mid-Continent Oil and Gas Association, Fort Worth, Texas
18-22 •National Safety Congress, Chicago, Ill.
25-29 •National Metal Exposition & Congress, Philadelphia, Pa. (A. G. A. will exhibit)

NOVEMBER

8-11 •American Petroleum Institute, Stevens Hotel, Chicago, Ill.
8-12 •National Hotel Exposition, Grand Central Palace, New York, N. Y. (A. G. A. will exhibit)
15-18 •National Association of Railroad and Utilities Commissioners, Savannah, Ga.
18-20 •School Food Service Association, second annual meeting, Statler Hotel, Detroit, Mich. (A. G. A. will exhibit)

DECEMBER

November 28-December 3 •American Society of Mechanical Engineers, New York, N. Y.
5-8 •American Society of Refrigerating Engineers, Washington, D. C.

New A. G. A. Members

GAS COMPANIES

Ocala Gas Co., Inc., Ocala, Fla. (C. C. Bryant, owner)

Pittston Gas Co., Oxford, Pa. (John H. Ware, 3rd, president)

Texas Gas Distributing Systems, Del Rio, Texas (L. B. Duke, partner)

ASSOCIATE COMPANIES

Ford, Bacon & Davis Construction Corp., Monroe, La. (Charles C. Whittelsey, vice-pres.)

MANUFACTURER COMPANIES

Dorwil Manufacturing Co., Pasadena, Calif. (Herbert W. Fry, owner)

Harrison Steel Cabinet Co., Chicago, Ill. (J. J. Rosenthal, sales manager)

Indianapolis Stove Co., Indianapolis, Ind. (Garvin M. Brown, president)

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John P. Breen, Philadelphia Electric Co., Philadelphia, Pa.

Gilbert G. Button, The Peoples Gas Light & Coke Co., Chicago, Ill.

Halsey J. Carr, Consolidated Edison Co. of N. Y., Inc., New York, N. Y.

Brian H. Carson, De La Rue Gas Development Ltd., London, England

Harvey R. Clapp, Jr., Gas Consumers Association, Baltimore, Md.

H. Walton Coles, Public Service Electric & Gas Co., Camden, N. J.

George S. Cushman, Consumers Power Co., Jackson, Mich.

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Joseph C. Stoesser, The Peoples Gas Light & Coke Co., Chicago, Ill.

C. William Swenson, Richmond Radiator Co., New York, N. Y.

Robert W. Tirrell, Ebasco Services, Inc., New York, N. Y.

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Michael J. Walsh, Consolidated Edison Co. of N. Y., Inc., New York, N. Y.

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Charles C. Whittelsey, Ford, Bacon & Davis Construction Co., Monroe, La.

Perspective

• In an old book there is a man who had a mania for building towers. He succeeded at last in building one tower with 11,000 stairs. Just as he was ready to congratulate himself upon his accomplishment, he looked up and saw the stars.

—*Chaplain*

Personnel Service

SERVICES OFFERED

Operating Executive—First class education. Fifteen years' experience all phases manufactured gas. Five years' research and development during war. At present Assistant Superintendent very large blue gas plant. Eastern location preferred. **1576.**

Gas Operating Engineer some experience in manufacture and distribution of water, coal, and propane gas desires position in gas company where he can get more operating experience. Single, State licensed graduate engineer. Florida location desirable but would be interested anywhere on eastern seaboard. **1577.**

Operating **Engineer** thoroughly familiar with all phases of Water Gas, Oil Gas and Butane-air **production** and **distribution.** Technical education (Graduate Engineer) and 27 years' unusually broad experience. **1578.**

Engineer, Mechanical—Graduate June 1948 NYU, Machine Shop experience. Married, available June 1 for position in East. **1579.**

Public Utility Holding Company **Statistician** seeks employment. Thirty years with company recently dissolved in compliance with Public Utility Act. Been in charge of analysis and preparation of comparable operating reports of subsidiary properties used for supervisory purposes. Covered gas, electricity, steam, water and transportation. Location New York City. Salary open. **1580.**

Manager—Utility serving 80,000 meters currently employed, desires new connection in position (administrative, technical or sales) which could utilize 25 years' experience all phases of gas utility operation and management with companies distributing water, coal and natural gas. No preference as to location. Graduate engineer (45). **1581.**

Fuel Technologist—June "48" graduate seeks employment preferably in sales engineering work, however will consider work in other phases of the Gas or allied industries. Courses of study include Fuel Gases and Gasification, Thermal Processing of Fuels, Combustion Engineering, and Plant Layout and Design. Veteran, single. (24). **1582.**

POSITIONS OPEN

Executive Accountant—For midwest natural gas company. Position requires a man under forty-five to work in Controller's Department. He should be a college graduate with experience in public and utiilty accounting and be able to supervise employees. Complete résumé with education, experience and salary expected will be received in strictest confidence. **0528.**

Gas Plant **Design Engineer** with 5 to 15 years' experience. **0529.**

Assistant: Distribution Department of New England Utility experienced in design operation and maintenance. Please furnish references and full particulars regarding education and qualifications. **0530.**

Development Engineer required for immediate placement to act as project engineer for appliance manufacturer on product development. Technical Education; with several years drafting and development experience. Furnish complete details of background and a photograph, previous salary record and requirements; age 25 to 40. **0531.**

Working foreman for small Propane-Air Gas Property, in city of 15,000 population. Good opportunity for one that understands Installation and Service of appliances, meters, etc. Prefer one that desires to work up to managerial position. **0532.**

Eastern Utility has an opening for a **technical** man with **Gas Plant** experience. **0533.**

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HEADQUARTERS, 420 LEXINGTON AVE., NEW YORK 17, N. Y.

A. G. A. TESTING LABORATORIES • 1032 East 62nd Street, Cleveland 14, Ohio • 1425 Grande Vista Avenue, Los Angeles, Calif.

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